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Metals Review

VOLUME XXIX, No. 9 September, 1956

THE NEWS DIGEST MAGAZINE

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TENTATIVE TECHNICAL PROGRAM

NATIONAL METAL CONGRESS AND EXPOSITION

Cleveland, Oct. 6 to 12, 1956

(All meetings to be held at the Hotel Statler)

Monday, Oct. 8

9:30 a.m.

PLASTIC DEFORMATION

Presiding Officers

L. J. Ebert, Case Institute of Technology
H. Y. Hunsicker, Aluminum Co. of America

Slip, Twinning and Fracture in Single Crystals of Iron, by J. J. Cox, Experimental Station, E. I. DuPont deNemours and Co., Wilmington, Delaware; G. T. Horne and R. F. Mehl, Department of Metallurgical Engineering, Carnegie Institute of Technology, Pittsburgh, Pa.

Dynamic Bi-Axial Stress-Strain Characteristics of Aluminum and Mild Steel, by George Gerard and Ralph Papirno, Research Division, College of Engineering, New York University, New York.

Some Exploratory Observations of the Tensile Properties of Metals at Very Low Temperatures, by E. T. Wessel, Westinghouse Research Laboratories, Pittsburgh, Pa.

Effect of Strain Rate and Temperature on the Plastic Deformation of High-Purity Aluminum, by T. A. Trozera, O. D. Sherby and J. E. Dorn, University of California, Berkeley, Calif.

Monday, Oct. 8

9:30 a.m.

IRON

Presiding Officers

Paul G. Nelson, The Budd Co.
Charles C. Reynolds
Massachusetts Institute of Technology

Effect of Subboundaries and Carbide Distribution on the Notch Toughness of an Ingot Iron, by J. C. Danko and R. D. Stout, Lehigh University, Bethlehem, Pa.

Notch Ductility of Malleable Irons, by G. A. Sandoz, N. C. Howells, H. F. Bishop and W. S. Pellini, Metals Processing Branch, Naval Research Laboratory, Washington, D. C.

New Nodular Iron Process, by Harry K. Ihrig, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

Deformation and Rupture of Gray Cast Iron, by W. R. Clough, Metals Research Laboratories, The Electro Metallurgical Co., Niagara Falls, N. Y., and M. E. Shank, Mechanical Engineering Department, Massachusetts Institute of Technology, Cambridge, Mass.

Monday, Oct. 8

2:00 p.m.

TITANIUM

Presiding Officers

W. Southard, Kennecott Copper Co.
James L. Wyatt, Horizons, Inc.

Relative High-Temperature Properties of the Hexagonal Close-Packed and Body-Centered Cubic Structures in Iodide-Titanium, by John Lunsford and N. J. Grant, Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Influence of Alloying on the Elastic Modulus of Titanium Alloys, by W. H. Graft, D. W. Levinson and W. Rostoker, Physical Metallurgy Research, Armour Research Foundation, Chicago, Ill.

A Study of the Air Contamination of Three Titanium Alloys, by J. E. Reynolds, H. R. Ogden and R. I. Jaffee, Nonferrous Physical Metallurgy Division, Battelle Memorial Institute, Columbus, Ohio.

Effect of Sulphur on the Properties of Titanium and Titanium Alloys, by L. W. Berger, D. N. Williams, and R. I. Jaffee, Nonferrous Physical Metallurgy Division, Battelle Memorial Institute, Columbus, Ohio.

Relationship Between Heat Treatment, Structure and Mechanical Properties of a Titanium Alloy Containing 4% Cr and 2% Mo, by A. W. Goldenstein and W. Rostoker, Physical Metallurgy Research Division, Armour Research Foundation, Chicago, Ill.

Tuesday, Oct. 9

9:00 a.m.

STEEL—I

Presiding Officers

F. Bolger, Battelle Memorial Institute
George H. Enzian,
Jones & Laughlin Steel Co.

Temperability of Steels, by L. D. Jaffe, Materials Section, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, Calif. and Edward Gordon, United Gas Corp., Shreveport, La., (formerly at Jet Propulsion Laboratory).

SEMINAR ON CREEP AND RECOVERY

(All meetings to be held at the Hotel Statler)

Saturday, Oct. 6

9:00 a.m.

Chairman: R. L. Cunningham
Bureau of Mines
Ottawa, Canada

Defects and Recovery, by J. S. Koehler, University of Illinois, Urbana, Ill.

Thermodynamics and Kinetics of Recovery, by M. B. Bever, Massachusetts Institute of Technology, Cambridge, Mass.

Polygonization, by W. R. Hibbard, Jr., General Electric Research Laboratories, Schenectady, N. Y.

2:00 p.m.

Chairman: B. L. Averbach
Massachusetts Institute of Technology

Recovery of Electrical Resistivity, by T. H. Blewitt, Oak Ridge National Laboratories, Oak Ridge, Tenn.

Recovery of Mechanical Properties, by E. C. W. Perryman, Atomic Energy Establishment, Chalk River, Canada.

Recovery of Internal Friction and Elastic Constants, by A. S. Nowick, Yale University.

8:00 p.m.

Chairman: Bruce Chalmers
Harvard University

Concept of Creep, by E. N. da C. Andrade, F.R.S., London, England

Sunday, Oct. 7

8:00 a.m.

Chairman: P. A. Beck
University of Illinois
Urbana, Ill.

Theory of Creep, by G. Schoeck, Westinghouse Research Laboratories, East Pittsburgh, Pa.

Role of the Boundary in Creep Phenomena, by E. R. Parker and J. Washburn, University of California, Berkeley, Calif.

Effect of Alloying Elements on Creep, by J. C. Fisher, General Electric Research Laboratories, Schenectady, N. Y.

2:00 p.m.

Chairman: Eric Jette
Los Alamos Scientific Laboratory
Los Alamos, N. Mex.

Spectrum of Activation Energies for Creep, by J. E. Dorn, University of California, Berkeley, Calif.

Creep and Fracture, by N. J. Grant, Massachusetts Institute of Technology, Cambridge, Mass.

Creep of Crystalline Nonmetals, by J. B. Wachtman, Jr., National Bureau of Standards, Washington, D C.

Temperature Dependence of the Hardness of 'Pure' Iron and Various Ferritic Steels, by F. Garofalo and D. C. Marsden, U. S. Steel Corp., Edgar C. Bain Research Laboratory, Monroeville, Pa., and G. V. Smith, Cornell University, Ithaca, N. Y.

Influence of Bainite on Mechanical Properties, by R. F. Hehemann, V. Luhanov and A. R. Troiano, Department of Metallurgical Engineering, Case Institute of Technology, Cleveland, Ohio.

On the Cooling Transformations in Some 0.40% Carbon Constructional Alloy Steels, by D. J. Blickwede and R. C. Hess, Research Department, Bethlehem Steel Co., Bethlehem, Pa.

Tuesday, Oct. 9

2:00 p.m.

STEEL—II

Presiding Officers

R. D. Chapman, Chrysler Corp.
C. T. Evans,
Universal-Cyclops Steel Corp.

Impact Characteristics and Mechanical Properties of Leaded and Nonleaded C-1050 and C-1141 Steels, by A. P. Weaver, Quality Control Department, Inland Steel Co., East Chicago, Ind.

Relation of Inclusions to the Fatigue Properties of SAE 4340 Steel, by H. N. Cummings, F. B. Stulen and W. C. Schulte, Curtiss-Wright Corp., Propeller Division, Caldwell, N. J.

Effect of Silicon on Transverse Properties and on Retained Austenite Content of High Strength Steels, by John Vajda, J. J. Hauser and Cyril Wells, Metals Research Laboratory, Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa.

Bend: Tensile Relationships for Toolsteels at High Strength Levels, by J. C. Hamaker, Jr., V. G. Strang and G. A. Roberts, Vanadium-Alloys Steel Co., Latrobe, Pa.

Wednesday, Oct. 10

2:00 p.m.

STAINLESS

Presiding Officers

A. E. Nehrenberg,
Crucible Steel Co. of America
E. E. Reynolds
Allegheny-Ludlum Steel Co.

Precipitation Reactions in Austenitic Cr-Mn-C-N Stainless Steels, by Chi-Mei Hsiao and E. J. Dulis, Research and Development Laboratory, Crucible Steel Co. of America, Pittsburgh, Pa.

Martensitic Transformation in the Machining of Austenitic Stainless Steel, by E. F. Erbin, Titanium Metals Corp. of America, New York, N. Y., E. R. Marshall, University of Vermont, Burlington, Vt., and W. A. Backofen, Metals Processing Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

Transformation Products in Cold Worked Austenitic Manganese Steel, by R. K. Buhr and S. L. Gertsman, Physical Metallurgy Division, Mines Branch, Department of Mines and Technology Surveys, Ottawa, Ontario, and James Reekie, Northern Electric Co., Ltd., Montreal, Quebec.

Metallography of Titanium-Stabilized 18-8 Stainless Steel, by T. V. Simpkinson, Republic Steel Corp., Warren, Ohio.

Phase Relationships and Mechanical Properties of Some Iron-Chromium-Carbon-Nitrogen Alloys, by G. F. Tisinai and C. H. Samans, Engineering Research Department, Standard Oil Co., Whiting, Ind.

Wednesday, Oct. 10

2:00 p.m.

NUCLEAR MATERIALS

Presiding Officers

W. D. Manly,
Oak Ridge National Laboratory
Frank Rough,
Battelle Memorial Institute

Creep and Stress Rupture Properties of Zirconium Effect of Annealing Treatment, by R. W. Guard and J. H. Keeler, Research Laboratory, General Electric Co., Schenectady, N. Y.

Transformation Kinetics of Uranium-Niobium and Ternary Uranium-Molybdenum-Base Alloys, by R. J. Van Thyne and D. J. McPherson, Metals Research Laboratory, Armour Research Foundation, Chicago, Ill.

Transformation Kinetics of Uranium-Molybdenum Alloys, by R. J. Van Thyne and D. J. McPherson, Metals Research Department, Armour Research Foundation, Chicago, Ill.

Plastic Deformation of Uranium on Thermal Cycling, by H. H. Chiswik, Metallurgy Division, Argonne National Laboratory, Lemont, Ill.

Thursday, Oct. 11

9:30 a.m.

HIGH TEMPERATURE—I

Presiding Officers

Glenn A. Fritzlen, Haynes Stellite Co.
L. P. Jahnke, General Electric Co.

Effect of Sigma Phase on Co-Cr-Mo Base Alloys, by Ronald Silverman, Sylvania Electric Co., Bayside, N. Y., William Arbiter, Nuclear Development Corp. of America, White Plains, N. Y., and Frank Hodi, U. S. Army.

An Austenitic Alloy for High-Temperature Use, by R. W. Guard and T. A. Prater, General Electric Research Laboratory, Schenectady, N. Y.

High-Temperature Rupture-Strength Properties of Chromium-Nickel Stainless Steels Containing Titanium and Boron, by J. Salvaggi and L. A. Yerkovich, Metallurgy Section, Materials Department, Cornell Aeronautical Lab., Inc., Buffalo, N. Y.

Effect of Environment on Creep-Rupture Properties of Some Commercial Alloys, by Paul Shahinian, Metallurgy Division, Naval Research Laboratory, Washington, D. C.

Influence of Molybdenum on the Phase Relationships of a High-Temperature Alloy, by H. J. Beattie, Jr., and F. L. VerSnyder, Applied Research Materials and Processes Laboratory, General Electric Co., Schenectady, N. Y.

Thursday, Oct. 11

2:00 p.m.

HIGH TEMPERATURE—II

Presiding Officers

J. Freeman, University of Michigan
E. J. Whittenberger, U. S. Steel Corp.

Mechanical Properties of Iron-Aluminum Alloys, by W. Justusson, V. F. Zackay and E. R. Morgan, Physical Metallurgy Section, Scientific Laboratory, Ford Motor Co., Dearborn, Mich.

Some High-Temperature Oxidation Characteristics of Nickel With Chromium Additions, by G. E. Zima, International Nickel Co., Bayonne, N. J.

Mechanical Properties of Swaged Iodide-Base Chromium and Chromium Alloys, by D. J. Maykuth and R. I. Jaffee, Nonferrous Physical Metallurgy Division, Battelle Memorial Institute, Columbus, Ohio.

Effect of Dispersion of Alpha Phase on the High-Temperature Fatigue Properties of Alpha-Beta Brass, by J. E. Breen, High-Temperature Alloys Branch, Naval Research Laboratory, Washington, D. C., and J. R. Lane, National Research Council, Washington, D. C.

Aging Reactions in Certain Super Alloys, by W. C. Hagel and H. J. Beattie, Jr., Materials and Processes Laboratory, General Electric Co., Schenectady, N. Y.

EDUCATIONAL LECTURE COURSE

EFFECT OF RESIDUAL ELEMENTS ON THE PROPERTIES OF METALS

Monday, Oct. 8

10:30 a.m.

Chairman: W. T. Lankford, Specialty Products, U. S. Steel Corp., Pittsburgh, Pa.

Fundamental Considerations, by E. R. Parker, University of California, Berkeley, Calif.

2:00 p.m.

Chairman: H. J. Smith, General Electric Co., Louisville, Ky.

Impurities in the Common Nonferrous Metals, by F. N. Rhines, Carnegie Institute of Technology, Pittsburgh, Pa.

Tuesday, Oct. 9

9:30 a.m.

Chairman: M. R. Meyerson, Thermal Metallurgy Section, U. S. Department of Commerce, National Bureau of Standards, Washington, D. C.

Residual Elements in Steel, by J. W. Halley, Inland Steel Co., East Chicago, Ind.

Impurities in Semiconductors, by J. H. Scaff, Bell Telephone Laboratories, Murray Hill, N. J. (To be presented by W. G. Pfann)

2:00 p.m.

Chairman: W. T. Lankford, Specialty Products, U. S. Steel Corp., Pittsburgh, Pa.

Newer Metals, Titanium, Zirconium, Molybdenum and Chromium, by D. J. McPherson, Armour Research Foundation, Chicago, Ill.

EDUCATIONAL LECTURE COURSE

FACTORS AFFECTING THE FATIGUE ENDURANCE OF CARBURIZED STEEL

(Sponsored by the American Society for Metals and to be presented by members of the metallurgical staff of the General Motors Corp.)

Thursday, Oct. 11

9:30 a.m.

Introduction, by J. B. Bidwell.

Physical Metallurgy of Carburized Steels, by G. H. Robinson.

2:00 p.m.

Residual Stresses in Carburized Steels, by W. S. Coleman.

Fatigue Durability of Carburized Steels, by R. L. Mattson.

Summary, by R. F. Thomson.

DISCUSSION FORUM ON DIE WEAR AND DIE LIFE IN STAMPING OPERATIONS

Thursday, Oct. 11

(All morning sessions by reservation only)

All Sessions Will be Held in the Cleveland Public Auditorium Ballroom.

9:30 a.m. Call to order
Announcements
Introduction of discussion group leaders.

10:00 a.m. All tables begin discussion of respective subtopics.

10:45 a.m. Notes from each table will be collected.
Chairman explains proposed form for recording data on die life.

11:00 a.m. All tables discuss the proposed forms.

11:30 a.m. Notes collected from each table.

11:45 a.m. Luncheon in the same room used for discussions.

(All afternoon sessions open to public)

1:05 p.m. Table reports on subtopic discussions.

2:15 p.m. Table reports on proposed form for data on die life.

3:25 p.m. Summary.

3:55 p.m. Adjournment.

This new type of discussion forum was formulated for the following purposes: 1) To exchange ideas and experiences on die wear and life; 2) To attempt agreement on uniform methods of recording data on die wear and die life for developing further information on die performance, leading to organized cataloging of experience. Each of three discussion groups, whose subjects will be "Minimizing Die Wear by Die Design", "Minimizing Die Wear by Part Design" and "Effect of Press Speed on Die Life", will be divided into tables of ten participants to discuss its subject informally. All groups will reconvene after lunch and listen to condensed reports on each of the smaller discussions. By this method the specific problems and questions of a majority of the members of the audience can be considered, and areas of agreement and disagreement of the total group can be summarized.

CONFERENCE ON THORIUM

(Jointly sponsored by Atomic Energy Commission and A.S.M.)

Thursday, Oct. 11

9:30 a.m.—Ballroom Carter Hotel

PREPARATION OF THE METAL

Chairman: F. H. Spedding, Institute for Atomic Research, Ames Laboratory, Ames, Iowa; **Co-Chairman:** E. Epremian, Atomic Energy Commission, Washington, D. C.

Role of Thorium Metal in the Nuclear Field, by John P. Howe, Atomics International, Downey, Calif.

Non-Nuclear Applications of Thorium Metal Other Than in Magnesium Technology, by William C. Lilliendahl, Westinghouse Electric Corp., Bloomfield, N. J.

Uses of Thorium in Magnesium Technology, by T. E. Leontis, Dow Chemical Co., Midland, Mich.

Production of Thorium Compounds, by Morton Smutz and John Barghusen, Ames Laboratory, A.E.C., Ames, Iowa.

Reduction of Thorium Tetrafluoride by Calcium, by Harley A. Wilhelm, Ames Laboratory, A.E.C., Ames, Iowa.

Consumable-Electrode Arc Melting of Thorium, by A. H. Roberson, U. S. Bureau of Mines, Albany, Ore.

Powder Metallurgy of Thorium, by B. Kopelman, Sylvania Electric Co., Bayside, N. Y.

Spectrographic Analysis of Thorium Metal, by V. A. Fassel and Edward DeKalb, Ames Laboratory, A.E.C., Ames, Iowa.

Chemical Analysis of Thorium Metal, by C. J. Rodden and Morris W. Lerner, New Brunswick (N. J.) Laboratory, A.E.C.

Purification of Thorium Metal by the Iodide or Hot-Wire Process, by Ivor E. Campbell, Battelle Memorial Institute, Columbus, Ohio.

Electrolytic Refining of Thorium, by R. A. Noland, Argonne National Laboratory, Lemont, Ill.

2:00 p.m.—Ballroom Carter Hotel

PROPERTIES OF THE METAL

Chairman: R. Carson Dalzell, Atomic Energy Commission, Washington, D. C.; **Co-Chairman:** H. A. Wilhelm, Institute for Atomic Research, Ames Laboratory, Ames, Iowa.

Physical Constants, Crystal Structure and Thermodynamic Properties, by J. F. Smith, Ames Laboratory, A.E.C., Ames, Iowa.

Atomic Structure of Thorium, Its Electron Energy and Other Considerations as to Solid State Physics, by T. G. Berlincourt, Atomics International, Downey, Calif.

Preferred Orientation in Thorium, by L. K. Jetter and Carl J. McHargue, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Fabrication and Cladding of Thorium Metal, by John H. Frye and Jack Cunningham, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Recrystallization and Grain Growth in Thorium Metal, by Edward J. Boyle, Electro Metallurgical Co., Niagara Falls, N. Y.

Mechanical Properties of Thorium Metal and High-Thorium Alloys, by John Milko and Robert E. Adams, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Corrosion Resistance of Thorium Metal and High-Thorium Alloys, by H. A. Pray and associates, Battelle Memorial Institute, Columbus, Ohio.

Metallography of Thorium, by Harriet P. Roth, Nuclear Metals, Inc., Cambridge, Mass.

Irradiation Damage in Thorium Metal, by Frank G. Foote, Argonne National Laboratory, Lemont, Ill.

Thorium Alloy Systems, by H. A. Saller and Frank A. Rough, Battelle Memorial Institute, Columbus, Ohio.

Hazards Associated With Thorium Metallurgy, by Adolph Voigt and Milo Voss, Ames Laboratory, A.E.C., Ames, Iowa.

Metal Show News

Metallographic Exhibit Scheduled for Metal Show

The 11th Metallographic Exhibit of the American Society for Metals will be held at the National Metal Congress and Exposition in Cleveland from Oct. 8 to 12.

Twelve classifications of micrographs are designated for the 1956 contest. Subjects include irons and steels, stainless steels and heat resisting alloys, aluminum, magnesium, beryllium, titanium and their alloys, copper, nickel, zinc, lead and their alloys, uranium, plutonium, thorium, zirconium and reactor fuel and control elements, metals and alloys not otherwise classified, series showing transitions or changes during processing, welds and other joining methods, surface coatings and surface phenomena, results by unconventional techniques (other than electron micrographs), slags, inclusions, refractories, cermets and aggregates, color prints in any of the above classes (no transparencies accepted).

A grand prize of $100 cash will be presented for the best entry in the show. Blue ribbons will be given to the best entry in each of the 12 classifications, with honorable mentions to others.

Prize-winning entries will be included in the A.S.M. traveling exhibit, starting out early in 1957.

Special Lecturer to Talk On Creep at A.S.M. Seminar

Edward N. da C. Andrade, who will deliver a special lecture on the "Concept of Creep" during the A.S.M. Seminar on Creep and Recovery, at the National Metal Congress in Cleveland, was born in London where he attended St. Dunstan's College and University College. He received a special B.S. in physics from the University of London when he was 19. His first research on the creep of metals was published in 1910.

Late in 1910 Dr. Andrade took up work under Lenard at the University of Heidelberg, where he received his Ph.D. degree. After a short period of research at Cambridge and London he went to work with Rutherford in 1913 on the subject of gamma rays.

During World War I he served as an artillery officer in France and was subsequently made professor of physics on the staff of the Military College of Science.

In 1938 he was appointed Quain Professor of Physics at the University of London. In 1950 he was appointed director in the Royal Institution as well as director of the Davy Faraday Research Laboratory, a position he resigned in 1952.

Dr. Andrade is a Chevalier of the Legion d'Honneur, a Corresponding Member of the Academie des Science, Institut de France. He received the Grande Medaille Osmond from the Societe Francaise de Metallurgie in 1951 for his researches on metals. He is the author of several books, including the Structure of the Atom, the Mechanism of Nature, Isaac Newton, and An Approach to Modern Physics. Dr. Andrade is an Honorary Librarian of the Royal Society.

Republic's Chairman to Speak at Awards Luncheon

Charles M. White, newly elected chairman of the board of Republic Steel Corp., third largest steel producer in the country, will be the principal speaker and guest at the first Annual Awards Luncheon of the American Society for Metals, to be held Tuesday, Oct. 9, at Hotel Statler, Cleveland.

Mr. White will discuss current aspects of the metal industry's engineering manpower problem and opportunities, in a talk entitled "Technical Manpower for a Technical Age".

"It is a great tribute to A.S.M. to have Mr. White as the speaker at this first Annual Awards Luncheon. It will be a meeting well worthwhile, full of inspiration and stimulation", said Mr. Eisenman, national secretary of A.S.M.

The Awards Luncheon, an important activity of the Metal Show Week, which runs from Oct. 8 through 12, will feature presentation of several special awards, each recognizing an accomplishment that has contributed greatly to the advance of metals engineering.

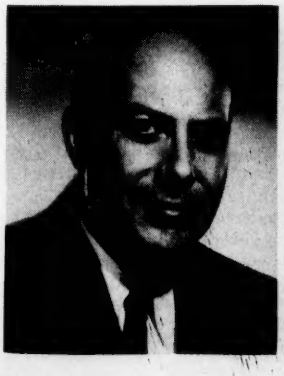
Joint Authors to Receive Howe Medal Award at Annual Awards Luncheon

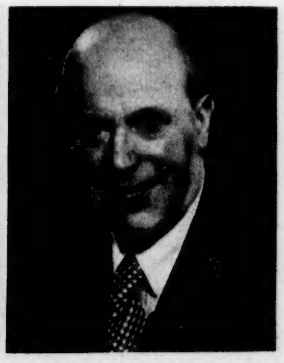
Recipients of the 1956 Henry Marion Howe Medal Award will be honored at A.S.M.'s Annual Awards Luncheon on Tuesday, Oct. 9, at Hotel Statler.

Alexander R. Troiano, professor and head of the department of metallurgy at Case Institute of Technology, William J. Barnett, former Case research associate now with General Electric Co. at Evendale, Ohio, and Richard P. Frohmberg, former Case research associate now a senior engineer with North American Aviation Corp., Downey, Calif., were chosen by the Howe Medal Award Committee for their joint paper "Delayed Fail-

(*Continued on page* 8)

John R. Dunning *C. M. White* *A. R. Troiano* *E. N. da C. Andrade*



ure and Hydrogen Embrittlement in Steel". (Transactions, Vol. 47).

Dr. Troiano, at Case since 1949 and head of the department since 1953, is the holder of three Harvard University degrees and formerly an instructor in physics at Middlesex College and instructor at Harvard's Graduate School of Engineering. He was professor and acting head of the metallurgy department at the University of Notre Dame before joining Case.

Dr. Barnett, who received his B.S. degree at Missouri School of Mines and his M.S. and Ph.D. degrees at Notre Dame, spent five years as a Case researcher and special lecturer, leaving early in 1956 to join General Electric as a metallurgist doing high-temperature turbine work. He worked for American Steel Foundries Co. from 1944 to 1946.

Dr. Frohmberg received his B.S., M.S. and Ph.D. degrees from Case, worked as a trainee, assistant metallurgist and research engineer for Ferro Machine and Foundry Co., Wellman Bronze and Aluminum Co. and Thompson Products, Inc. He was a Case research associate and part time instructor from 1952 until 1955.

The Howe Medal Award was established in 1923 to perpetuate the memory of the long-time Columbia University professor who pioneered in the development of the science of metallography.

Dunning of Columbia to Present Banquet Talk

John R. Dunning, dean of the School of Engineering at Columbia University, will present a talk on the development of the atom at the Annual Banquet of the American Society for Metals, to be held on Thursday, Oct. 11, at the Hotel Statler, Cleveland.

Dr. Dunning, who has a reputation for humorous delivery of difficult subject matter, was among those most closely identified with the "Manhattan District" project, which was initiated on the Columbia University campus and culminated in the first atomic bomb. He represented the Manhattan District at the Operations Crossroads atom bomb detonations off Bikini atoll in July 1946.

Dr. Dunning is the author, with H. W. Farwell of "Matter, Energy and Radiation—Syllabus", and "Matter, Energy and Radiation", with H. C. Paxton. He has contributed several articles to technical and scientific publications and has written many monographs and papers on atoms, atomic transmutations, neutrons, nuclear physics, nuclear energy process and atomic power applications.

Dr. Dunning received his B.S. degree at Nebraska Wesleyan University in 1929, a Ph.D. at Columbia in 1934, an honorary Sc.D. from Nebraska Wesleyan in 1945 and an honorary LL.D. from Adelphia College in 1951.

Assistant Editor Joins Metal Progress Staff

Dave Ritchie, former welding sales engineer with Lincoln Electric and A. O. Smith Corp., has been appointed assistant editor of *Metal Progress*.

Mr. Ritchie, a native of Canada, received his high-school education in St. John, New Brunswick. In 1945 he entered the University of New Brunswick, receiving his bachelor degree in 1949.

Dave Ritchie

In the fall of 1949 he entered Western Reserve University in Cleveland, graduating with a degree in business administration. He has since completed two technical courses at Fenn College, one in metallurgy, the other in electrical circuits.

Following his welding sales experience with Lincoln Electric and A. O. Smith, Dave returned to Cleveland early in 1955 as associate editor of *Industry and Welding* and *Welding Illustrated,* published by Industrial Publishing Co.

Mr. Ritchie was a combat pilot during World War II with the Royal Canadian Air Force and saw service in the Asia, Africa and European theatres. At the close of the war he was flight commander of a photo reconnaissance squadron for the Royal Air Force.

Metals Division Program To Feature Literature of The Atomic Energy Field

How to keep informed of the newest advances in the atomic energy field as they relate to metallurgy will be the general subject of two sessions sponsored by the Metals Division of Special Libraries Association and presented at the National Metal Congress on Oct. 11.

"The Metallurgist and the Literature of Atomic Power" is the subject of a paper by Fred E. Croxton and Philip Leslie of Goodyear Atomic Corp. They will discuss the scope of the power program in this country and the world-wide literature on the subject.

Mr. Croxton has been connected with the U. S. Atomic Energy Program since 1944, primarily in the gaseous diffusion process, but also with various other programs. He has served since 1949 as technical advisor to the plant librarian with Union Carbide Nuclear Co., Oak Ridge, Tenn., as chief of the cataloging branch, Technical Information Service, U.S. Atomic Energy Commission, and since 1953 as superintendent, information and records, Goodyear Atomic Corp.

Mr. Leslie is head technical librarian at Goodyear.

OBITUARIES

HENRY A. SALLER, 38, assistant technical director, Battelle Memorial Institute, died suddenly in a Greenburg, Pa., restaurant of an apparent heart attack in August. Mr. Saller had attended a conference called by the Atomic Energy Commission earlier that day in Pittsburgh. He was one of the country's leading authorities on materials used in the construction of atomic reactors and was a specialist in nuclear metallurgy.

Mr. Saller joined Battelle in 1941 and achieved prominence in the A.E.C. program when he served as a consultant in the fabrication of the first 50 tons of uranium for the prototype of the reactors at Hanford, Wash. He was author of more than 130 reports to the A.E.C. and of numerous papers. He had recently returned from England where he was a member of a commission studying atomic energy projects there. He was a member of the Columbus Chapter A.S.M. and of the Nuclear Society, past chairman of the A.E.C. metallographic committee, and, at the time of his death, was chairman of the subcommittee on process metallurgy and fuel element fabrication of the Atomic Industrial Forum. He graduated from Purdue University.

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HARRY C. BOARDMAN, 69, director of research, Chicago Bridge and Iron Co., died early in August in Chicago. He was born in Plainfield, Ill., and was a graduate of the University of Illinois. He held an honorary Ph.D. degree from the South Dakota State School of Mines.

Following service in World War I Mr. Boardman taught at the University of Illinois and was in business in Kansas City. He was committee chairman for the American Society of Mechanical Engineers, a past-president of the American Welding Society, and past-chairman of the Welding Research Council. Dr. Boardman was a member of the Chicago Chapter.

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Cold Working—Such nuclear metals as titanium, zirconium, uranium, and their alloys, can be cold worked by a process developed by Tube Reducing Corp., which feeds tubular extrusions through special purpose machines to give precision-sized cylinders with high-surface finishes, and eliminates annealing, pickling and trimming operations, as well as scrap.

Automotive Robot — A robot test dummy made in the likeness and responses of the human is being produced by Investment Casting Co., Springfield, N.J. Engineers, following exact medical specifications, decided that the most practical way to make the cervical vertebrae was by investment casting. A perfect replica of the cervical vertebrae was produced and made to fit together in a modified ball and socket relationship.

Power Confab—The American Power Conference, sponsored by Illinois Institute of Technology, in cooperation with 14 universities and nine technical societies, will be held at the Hotel Sherman, Chicago, March 27-29, 1957. The conference for some 3000 business and industrial executives, engineers, educators and government officials, provides a forum for the discussion of problems and exchange of information concerning the electric power industry and associated activities.

Information Center — A Cobalt Information Center has been established at Battelle Memorial Institute, Columbus, to encourage cobalt research and to provide technical and economic information for users in the metallurgical, chemical, ceramics, electronics, pharmaceutical and nucleonics industries. Data on technological advances will be gathered and organized at the center, which is supported by major cobalt producers.

Zinc Impurities—Very small amounts of impurities can be determined precisely with an electrolytic procedure developed by the National Bureau of Standards, which does not require preliminary chemical separations, is relatively fast, and needs little operative attention. The new procedure deposits metal in a mercury cathode from which impurities are removed selectively by anodic dissolution for quantitative determination.

Argonne Expands — In response to needs for nuclear training beyond the capacity of the original summer school for engineering college faculty members at Argonne National Laboratory, a second school has been scheduled. The supplementary institute will be conducted at Brookhaven National Laboratory, Upton, Long Island, N.Y. Sponsored jointly by the A.E.C., the National Science Foundation, and American Society for Engineering Education, the Brookhaven program will accommodate 30 additional candidates.

New Flux—Noncorrosive, quick wetting solder fluxes designed primarily for use on copper and copper-base alloys are now being manufactured by Federated Metals Div. of American Smelting and Refining Co. These new fluxes utilize safe-to-handle derivatives of the war-born chemical, hydrazine.

Metallurgy Department—The director of physical sciences research at Stanford Research Institute has announced the formation of a department of metallurgy. Formerly a section of S.R.I.'s chemistry department, metallurgy has been given departmental status due to the growth of programs and staff. New facilities available for metallurgical research include equipment for melting, creep testing and high-vacuum studies. The present program primarily concerns high-temperature alloys, liquid metallurgy, corrosion and electrochemistry.

Reactor Vessel — Company officials have announced that Franklin Institute's Laboratories for Research and Development will aid in designing a boiling-water reactor vessel for the projected Dresden nuclear power plant near Chicago. The Institute's engineers will cooperate with the New York Shipbuilding Corp., to design and test the vessel, which will house the radioactive heart of the plant.

Frankfurt Meet — ACHEMA, 1958, the 12th Chemical Apparatus and Equipment Congress and Exhibition is now in the stage of preparation. From May 31 to June 8, 1958, the organizer, DECHEMA, expects over 10,000 specialists to attend the German meet. Topics to be covered will include nuclear physics and technology, laboratory technology, operational techniques, research and literature, materials, and measurement and control technology.

Research Lab — The new ores research building of Michigan College of Mining and Technology's Bureau of Mineral Research was dedicated on Aug. 8. The $750,000 building is Michigan's first state-supported laboratory for research on uses of low-grade ores and other minerals. Primary research will be done on copper and iron ores, however the Bureau will consider research on problems involving dolomite, limestone, salt and brines, oil and natural gas.

Expansion—Plans for a substantial expansion of production facilities at its Electromanganese Division, have been announced by Foote Mineral Co. The new construction, to cost about $2,000,000 will be started immediately with completion expected early in 1958. Increasing demands for electrolytic manganese—particularly for use in the low-nickel stainless steels—necessitated the move.

Inside Look—A General Electric-Detroit Arsenal engineering team has achieved the feat of making motion pictures of the innards of an engine while it is running. The job involves taking X-ray pictures of the internal movements of the engine through its steel housing and visually stopping with a camera the high-speed motion. The new technique is called stroboradiography.

Aluminum Used — The Miami-to-Jacksonville Turnpike, with partial completion set for January 1957, will use more aluminum per mile than any other highway project in history. Aluminum signs and sign posts, light standards and bridge railings are now being installed. Reynolds Metals Co. is supplying basic extrusions for the job. The signs are composed of new-type interlocking aluminum panels.

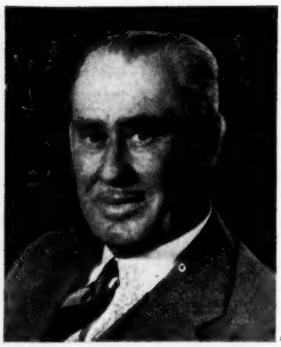
Production Feat — Over 122-million tons of steel in a 12 consecutive month period was produced in the United States, according to an announcement made by the industry a few days before the 180th birthday of this industrial nation. Over one billion tons has been produced since the end of World War II.

A.S.M. Past President, Oscar E. Harder, Dies

Oscar E. Harder, 73, one of the founders of Battelle Memorial Institute and one of the country's outstanding metallurgists, died early in July.

Dr. Harder was assistant director of Battelle from 1930 until his retirement in 1949. Since then he had been active as a consulting metallurgist.

He was chiefly responsible for the development of elgiloy, used in making watch mainsprings, and considered one of the greatest advances in watchmaking. He also helped develop leadloy, and easily machined steel alloy and was active in development of many dental alloys.



O. E. Harder

Dr. Harder was the author of several books and technical papers and held a number of patents on steels and bearing materials.

He received his B.A. degree at the University of Oklahoma, his M.A. degree at Oklahoma, and his Ph.D. at the University of Illinois.

Dr. Harder was a past national president of the American Society for Metals and a Howe Medalist of the Society.

He belonged to numerous technical and professional organizations.

IMPORTANT MEETINGS *for October*

Oct. 1-3—American Institute of Electrical Engineers. Fall General Meeting, Morrison Hotel, Chicago. (N. S. Hibshman, Secretary, A.I.E.E., 33 W. 39th St., New York 18)

Oct. 4-5—Magnesium Association. Annual Meeting, Drake Hotel, Chicago. (Jerry Singleton, Secretary, M. A., 122 E. 42nd St., New York 17)

Oct. 8-12—American Society for Metals. Annual Meeting. Hotel Statler, Cleveland. (W. H. Eisenman, A.S.M., Secretary, 7301 Euclid Ave., Cleveland 3)

Oct. 8-12—American Welding Society. Fall Technical Meeting, Hotel Cleveland, Cleveland. (J. G. Magrath, A.W.S., Secretary, 33 W. 39th St., New York 18)

Oct. 11-12—National Foundry Association. Annual Meeting, Sheraton-Cadillac Hotel, Detroit. (C. T. Sheeham, N.F.A., Executive Secretary, 53 W. Jackson Blvd., Chicago 4)

Oct. 28-Nov. 1—Electrochemical Society. Fall Meeting, Hotel Statler, Cleveland. (H. B. Linford, E.S., Secretary, 216 W. 102nd St., New York, 25)

Oct. 29-30 — Refractories Institute. Fall Meeting, The Homestead, Hot Springs, Va. (Avery C. Newton, R.I., Executive Secretary, First National Bank Bldg., Pittsburgh 22)

Oct. 29-Nov. 1—Wire Association. Annual Meeting, William Penn Hotel, Pittsburgh. (Richard E. Brown, W.A., Secretary, 435 Main St., Stamford, Conn.)

Oct. 30-Nov. 2—Gray Iron Founders Society Inc. Annual Meeting. The Homestead, Hot Springs, Va. (Donald H. Workman, G.I.F.S. Executive Vice-President, National City E. 6th Bldg., Cleveland 14)

New Films

The Petrified River

A 28-min. color film about uranium and its peaceful uses, modern aerial prospecting, the numerous mines on the Colorado Plateau, atomic power stations and the Oak Ridge "atomic pharmacy." This 16-mm. movie was produced with technical assistance by the A.E.C., by Union Carbide and Carbon Corp. Prints are available from Modern Talking Picture Service, 3 East 54th St., New York 22.

Cutting Fluids

A brief, clear, basic summary of present-day knowledge on the role of coolants in metalworking practice. The 19½ min. sound color film, released by the Texas Co., shows how cutting fluids work to cut down the harmful effects of heat and friction created during the metalcutting process. A basic discussion opens the film and then it is divided into two parts, cutting oils, and water-based emulsions (solubles). The first section points out the various materials used in making cutting oil and each component is analyzed to see how it prevents or cures the heat problems that arise during chip formation. Rules are given to help the user stay out of trouble. The second section tells how a properly made and properly handled emulsion can combat many problems. Information on the movie can be obtained from the Texas Co., 135 East 42nd St., New York 17.

Promotions Announced By Ohio Crankshaft Co.

Foster H. Pettay has been elected president of the Ohio Crankshaft Co., manufacturer of diesel engine crankshafts and pioneers in the field of induction heating.

Appointment of M. J. Hoke as senior vice-president and general manager, and Paul T. Koenig as secretary and treasurer of the company, was also announced by board chairman W. C. Dunn.

F. H. Pettay

Mr. Pettay joined the organization in 1941. He was made a director of the company in 1950 and was named vice-president in 1952. He became secretary - treasurer in 1953 and senior vice-president in 1955.

Mr. Pettay, a native of Ohio, received his B.A. degree from Ohio State University in 1926. A member of the Ohio Bar Association, he was graduated from Harvard Law School and joined the Cleveland firm of M. B. and H. H. Johnson in 1930.

Mr. Hoke, now senior vice-president and general manager, was formerly vice-president and general manager of the Camshaft and Crankshaft Division of General Motors and with the Cincinnati Milling Machine Co. He was graduated from the University of Cincinnati in 1939 with a degree in mechanical engineering.

M. J. Hoke

Mr. Koenig, the new secretary-treasurer, joined Ohio Crankshaft in 1941 as an accountant. He has been office manager, assistant controller and controller. He did public accounting and was associated with Industrial Rayon Corp. immediately following his graduation from the Western Reserve School of Business Administration.

Mr. Pettay is the third president of Ohio Crankshaft Co.

A.S.M. has an annual budget in excess of one million dollars.

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

240-A. Dephenolizing With Centrifugal Extractors. Walter J. Podbielniak and Herbert R. Kaiser. *Blast Furnace and Steel Plant*, v. 44, July 1956, p. 760-764.

A centrifugal, countercurrent, multistage solvent extractor is applied to the removal of phenols from waste liquors of coke oven operations. (A8, B18)

241-A. Induction Heating Handling Problems. D. Warburton Brown. *Welding and Metal Fabrication*, v. 24, July 1956, p. 256-261.

Mechanisms for obtaining linear motion; main types of handling fixtures. (A5, J2)

242-A. (French.) Tour of the Aluminum World. G. A. Baudart. *Revue de l'Aluminium*, v. 33, no. 232, May 1956, p. 459-464.

Tabulates and discusses European aluminium potential by country. (To be continued.) (A4, Al)

243-A. (Polish.) The Relation Between Production Costs and the Metal Content of a Concentrate. Wlodzimierz Stepinski. *Archiwum Gornictwa*, v. 1, no. 2, 1956, p. 199-222.

For lowest total production costs of a ton of metal there is a well-defined optimum figure for the average metal content of the concentrate. Increasing or decreasing this average content increases total costs. Figures and formulas for determining optimum content given. (A4, B14)

244-A. (Spanish.) The Use of Soft Scrap Iron in a Medium-Size Cupola. Emerico Ehrenstein Pollak. *Instituto del Hierro y del Acero*, v. 9, no. 46, May 1956, p. 536-540; disc., p. 540-542.

Melting tests using soft scrap iron obtained from production processes as a substitute for ingots. (A8, E10, Fe)

245-A. (Swedish.) Design of Foundry Buildings. E. O. Lissell. *Gjuteriet*, v. 46, no. 4, Apr. 1956, p. 53-57.

Factors governing layout of foundries, data relating to floor area and dimensions and construction requirements. (A5, E general)

246-A. The Functions and Education of Welding Engineers. *British Welding Journal*, v. 3, July 1956, p. 275-297.

Educational facilities in France, Germany and the United States. The work of the International Institute of Welding on welding instruction. Some proposals for improving higher education in welding. (A3, K general)

247-A. Arc Welding Costs: An Example of Shop Work Measurement. A. G. Thompson. *British Welding Journal*, v. 3, July 1956, p. 306-322.

Work measurement tests were made on arc welded joints during the manufacture of transformer tanks and allied fabrications. Production data analyzed so the accuracy of cost relations might be assessed. (A4, K1)

248-A. Some Economic Aspects of Corrosion. A. Keynes. *Corrosion Technology*, v. 3, July 1956, p. 226-227.

General economic analysis. (A4, R general)

249-A. Treatment of Plating Shop Effluent. J. Lakin. *Electroplating and Metal Finishing*, v. 9, July 1956, p. 221-224.

Discussion of improved flow system of treatment with sulfur dioxide and chlorine, with particular reference to the chemical engineering considerations involved in a new British effluent treatment plant. (A8, L17)

250-A. Scrap Investigation. J. McGrandle. *Foundry Trade Journal*, v. 101, July 5, 1956, p. 5-16.

Information on how to collect data on scrap castings and how to analyze them. Possible ways of using this information. (A8, E10)

251-A. Engineering Enrollment. W. B. Plank. *Journal of Metals*, v. 8, July 1956, p. 827.

Undergraduate and graduate student enrollment in all branches of engineering. (A3)

252-A. The Industry in the World Today. *Light Metals*, v. 19, July 1956, p. 207-210.

Position of Canadian aluminum industry in the light of recent and contemporary developments, particularly in its main markets in the United States and England. (A4, Al)

253-A. 1955 Western Europe Primary Zinc Use Rose to 925,000 Metric Tons From 690,000 Tons in '52. R. L. Stubbs. *Metals (Daily Metal Reporter Monthly Supplement)*, v. 27, July 1956, p. 9-10, 19.

Trends in consumption and production during past three years; prediction for the future. (A4, Zn)

254-A. Selling Aluminum. E. A. Farrell. *Modern Metals*, v. 12, July 1956, p. 76 + 9 pages.

Operation of aluminum company's sales division. Present and potential products and markets. (To be continued.) (A4, Al)

255-A. Report From Europe. *Modern Metals*, v. 12, July 1956, p. 44, 48, 50, 52.

Production, consumption and applications of light metals in various European countries. (A4, EG-a)

256-A. Non-Ferrous Metals Research. *Product Finishing*, v. 9, June 1956, p. 79-80.

Investigations by British research organization into various phases of electrodeposition, galvanizing and other finishing processes. (A9, L17, L16)

257-A. Chromium Recovery From Plating Solutions. W. S. Morrison. Paper from "Ion Exchange Technology", Academic Press Inc., p. 321-339.

Theoretical and applied considerations; an anion exchange system. (A8, L17, Cr)

258-A. (Czech.) Present-Day Views on the Dangers of Electric Welding to Health and Hygienic Working Conditions. Vladimir Cirman. *Zvaranie*, v. 5, no. 4, Apr. 1956, p. 120-123.

Dangers from several methods of arc welding and from resistance welding. Medical findings on eye, skin, respiration illnesses and "welders' neurosis". Methods of protecting the workers. (A7, K1, K3)

259-A. (French.) Sir Henry Bessemer, a Great Inventor and a Business Man. Georges Delbart. *Revue de Métallurgie*, v. 53, no. 6, June 1956, p. 401-410.

The life and numerous inventions of Bessemer. History of the invention of the conversion process. Present development of the Bessemer-Thomas process. (A2, D3, ST)

260-A. (Italian.) Manufacturing Cost of Wrought Iron, Openhearth and Electric Processes. *Metallurgia Italiana*, v. 48, no. 5, May 1956, p. 193-258.

Comparative economic study of above processes in the Italian steel industry. (A4, D2, D5, D8, Fe-m)

261-A. (Swedish.) Progress in the Field of Metallurgy and Metal Finishing. Edy Velander. *Teknillisen Kemian Aikakausilehti*, v. 13, no. 10, June, 1956, p. 283-284, 287-288.

Recent developments in powder metallurgy, flame spraying, ceramic coatings and other new finishing techniques. Titanium developments, vacuum casting of steel, production of rhenium and the increasing use of selenium and germanium. Manufacture of sulfite pulp digesters of sandwich construction. (A general, H general, L general, Re, Ge, Se)

262-A. Metallurgical Library Pays Its Own Way. M. O. Baker. *Iron Age*, v. 178, Aug. 2, 1956, p. 96-98.

Based on average needs of 20-man research-team company, initial and operating costs are broken down and rated against present methods. (A general)

263-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 273-280.

From "spray quenching" to "stress-strain diagram". (A10)

264-A. What to Look for in a Plant Site. James R. Allan. *Modern Castings,* v. 30, Aug. 1956, p. 49-53.

Some considerations are zoning, meterological factors, freedom from floods, transportation facilities, electric power and water supplies, availability of workers and character and price of land. (A5)

265-A. (Polish.) **Nonferrous Metals and Alloys.** E. Kamienski. *Przeglad Techniczny,* v. 77, June 1956, p. 245-246.

Great growth in use of aluminum, due to increased use in construction and as a replacement for copper wire. Aluminum alloys have great strength in relation to weight. Magnesium use is restricted by cost and low corrosion resistance. Some comments on titanium, beryllium and tin included.
(A4, T26, Al, Cu, Mg, Ti, Be, Sn)

266-A. (Pamphlet.) **The Outlook for the Steel Industry and Its Implications for the Economy.** Willian H. Lowe. 19 p. 1956. Institute of Investment Banking, Philadelphia, Pa.

Trends in production, consumption, prices and operating costs. Graphs, diagram. (A4, ST)

267-A. (Book) **Quin's Metal Handbook, 1955.** 719 p. 1955. K. V. Henderson, editor. Metal Information Bureau, Limited, Birkett House, 27 Albemarle St., London, W.1, England.

Statistics, price records, and miscellaneous information useful to those dealing in raw, semi-finished, and fabricated metals, and metallic ores. (A4)

B

Raw Materials and Ore Preparation

184-B. New Sintering Plant Facilities at Sparrows Point. Hobart M. Krauer and R. E. Hauser. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 757-759.

Plant design and operation.
(B16, Fe)

185-B. Automatic Mechanism Saves Fuel on Furnaces. W. E. Boger. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 765-766.

Control system automatically uses all available coke oven gas and adds the amount of base fuel needed for the total B.T.U. input to the furnace. It records all important variables and permits manual operation of fuel valves at any time.
(B18, D2, ST)

186-B. (French.) **A Study of Thermal Shock of Refractory Materials.** Marcel Francois. *Chaleur & Industrie,* v. 37, no. 371, June 1956, p. 143-158.

Testing refractory brick for furnace linings. Construction and use of a special burner and metering instrument for performing the tests. The sample is rapidly heated under controlled conditions and then evaluated. (B19)

187-B. (German.) **The Behavior of High-Melting High-Metal Silicides With Respect to Boron, Carbon, Nitrogen and Oxygen.** H. Nowotny, B. Lux and H. Kudielka. *Monatshefte für Chemie,* v. 87, no. 3, Mar. 1956, p. 447-470.

The effect of addition of various elements on the silicides of the transition metals. (B19, Si)

188-B. (Polish.) **Refractory Materials Used in the Casting Industry.** Stanislaw Kobylinski. *Przeglad Odlewnictwa,* v. 6, no. 5, May 1956, p. 139-144.

State standards for refractories in equipment for cast steel and cast iron production. Mechanical properties and service life of quartz fire clay products. Materials for refractories made with silica and other materials. (B19, E11, CI)

189-B. (Spanish.) **Ferromanganese Ores From Portugal.** Joao Manuel Cotelo Neiva. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 359-363.

Describes deposits of the ores in Portugal, their geology and chemistry. (B10, Fe-n)

190-B. (Spanish.) **Fuels for Furnaces and Their Application.** James L. Adamson and William Somerville. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 512-518.

Application of liquid and gas fuels to different types of furnaces in ferrous and nonferrous industries; examples to show the effect of the type of fuel on the general running of a furnace. (B18, D1, D2, C21)

191-B. (Spanish.) **Modulus of Rupture of Spanish Refractory Materials.** Vincent Gomez Garcia. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 543-547.

Results of determining the modulus of rupture of different types of refractory material (silicon, silicon-aluminum, aluminum, magnesium and chromium-magnesium) produced in Spain. (B19)

192-B. (Spanish.) **Metallographic Study of Renn-Krupp Nodules.** Francisco Munoz del Corral, Jose A. Boned Sopena and Jose M. Bermudez de Castro. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 578-584.

Study of nodules resulting from sintering of mixtures of Spanish iron ores. (B16, M27, Fe)

193-B. Fifty-Hour Load Test for Measuring the Refractoriness of Super-Duty and High-Duty Fireclay Brick. G. R. Eusner and W. H. Schaefer, Jr. *American Ceramic Society Bulletin,* v. 35, July 1956, p. 265-270.

Both types of bricks were tested by the ASTM load tests and by a 50-hr. 2500° F. load test. Kymographs show actual subsidence for brick manufactured in various regions. The test permits direct comparison of super-duty and high-duty brick and provides more accurate predictions of behavior in service. (B19)

194-B. Cananea's Program for Leaching in Place. Robert C. Weed. *Mining Engineering,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, July 1956, p. 721-723.

Construction and operation of both underground and surface leaching plants for copper ores. (B14, Cu)

195-B. Reagent Control in Flotation. C. H. G. Bushell and M. Malnarich. *Mining Engineering,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, July 1956, p. 734-737.

Method of analyzing for xanthate in flotation solutions. There is high correlation of metallurgical results to pH and xanthate concentration. (B14, S11)

196-B. A Kinetic Study of the Leaching of Molybdenite. William H. Dresher, Milton E. Wadsworth and W. Martin Fassell, Jr. *Mining Engineering,* v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 205, July 1956, p. 738-744.

Both oxygen over-pressure and potassium-hydroxide concentration control the rate of leaching.
(B14, Mo)

197-B. Angle-Transvaal Group Reduction Plant Practice. L. A. Waspe. *Canadian Mining Journal,* v. 77, July 1956, p. 61-66, 76.

In survey of the gold reduction plant practice of the group, the Virginia and Merriespruit plants are described as representative of the most recent developments. (B14, Au)

198-B. Solids-Gas Contacting—Close-Up of a Key Tool in Metallurgy. Raymond E. Vener. *Engineering and Mining Journal,* v. 157, July 1956, p. 78-91.

Analyzes contacting operations and describes commercial equipment for solids-gas contacting.
(B14, B15, B16)

199-B. Pilot-Scale Coke Ovens—Development and Operation. R. Tracy Eddinger and J. Mitchell. *Industrial Heating,* v. 23, July 1956, p. 1440-1442.

A pilot-scale test oven was built to determine the effect of coal blends and operating variables on coke quality. Shatter and tumbler data suggest that present test procedures are satisfactory to predict plant-oven carbonization results from test-oven results. (B18)

200-B. Development of the Dwight-Lloyd Sintering Process. H. E. Rowen. *Journal of Metals,* v. 8, July 1956, p. 828-831.

Historical development of ferrous sintering. (B16, ST)

201-B. The Krupp-Renn Process in Czechoslovakia. *Journal of Metals,* v. 8, July 1956, p. 849.

Procedure, advantages and defects of process for concentrating highly acid iron ores. (B14, Fe)

202-B. Agglomeration of Luxembourg and Lorraine Iron Ore Fines. J. Paquet. *Journal of Metals,* v. 8, July 1956, p. 850-851.

Production requirements, chemical analysis and porosity and density data on agglomerates produced by the Dwight-Lloyd and the rotating furnace processes. (B16, Fe)

203-B. Self-Fluxing Agglomerates in the USSR. *Journal of Metals,* v. 8, July 1956, p. 852.

The use of lime agglomerate results in a reduction of coke rates and an increase in the rate of blast furnace output (B16, D1, ST)

204-B. Cyclone Classification and Thickening at Manganese, Inc. S. J. McCarroll. *Mining Congress Journal,* v. 42, July 1956, p. 50-51.

Eight 12-in. cyclones are used to classify 1200 tons of ore per day. Additional cyclones disperse and thicken manganese concentrates. Performance records show capabilities and limitations of equipment.
(B14, Mn)

205-B. Metallurgist's View on Milling Base Metal Ores. F. W. McQuiston, Jr. *Mining Engineering,* v. 8, July 1956, p. 699-700.

Best results are obtained by establishing good cooperation with the geologist and the mining engineer.
(B13)

206-B. Geologist-Metallurgist Cooperation in Porphyry Copper Exploration. Kenyon Richard. *Mining Engineering,* v. 8, July 1956, p. 703-705.

Limitations of each field, and need for a balance between necessity of desired information and the cost. (B14, Cu)

207-B. Metallurgical Planning in Connection With Lead-Zinc or Lead-Zinc-Copper Mines. M. B. Kildale. *Mining Engineering,* v. 8, July 1956, p. 706-707.

Major contributions of the geologist to metallurgical planning. (B14, Pb, Zn, Cu)

208-B. Progress Report on Uranium Extraction With Organonitrogen Compounds. D. J. Crouse, K. B. Brown, W. D. Arnold, J. G. Moore and R. S. Lowrie. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2099, May 1956, 63 p.

Experimental data on a number of compounds. (B14, U)

209-B. Uranium Raw Materials Process Cost Estimates One Through Ten. R. H. Guymon, B. B. Klima, A. D. Ryon, W. T. Ward and R. R. Wiethaup. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-1998, Nov. 1955, 98 p.

Investigates and evaluates different reagents to extract uranium from the aqueous solutions that are encountered in the processing of uranium ores. (B14, A4, U)

210-B. International Trials of Bricks for All-Basic Furnace Roofs. *Refractories Journal,* v. 32, June 1956, p. 264-267.

Comparisons of ten different brands of bricks show that variations in performance are so small that only a tentative order of merit can be deduced. (B19, D2)

211-B. Mineral-Dressing Investigations of the Recovery of Pyromorphite From a Newton County, Mo., Deposit. D. W. Frommer and M. M. Fine. *U. S. Bureau of Mines, Report of Investigations* 5246, June 1956, 5 p.

The excellent grade of 62.4% lead was attained at a recovery of 44.0% by fatty-acid flotation of a pulp previously deslimed by chemical dispersion and decantation. (B14, Pb)

212-B. Laboratory Concentration of Various Alaska Copper Ores. R. R. Wells. *U. S. Bureau of Mines, Report of Investigations* 5245, June 1956, 9 p.

Preliminary mineral dressing studies on five ore samples. (B14, Cu)

213-B. Investigation of Organic Reagents as Collectors for the Flotation of Uranium Minerals (First Progress Report). J. N. Butler and R. J. Morris. *University of Nevada, U. S. Atomic Energy Commission.* AECU-3137, July 1954, 20 p.

Preliminary results with oxygen-containing uranyl-chelates were negative but information as to active functional groups, types of coordination centers, structural configurations, chelate stability and other factors dealing with surface chemistry was obtained. (B14, U)

214-B. Application in Hydrometallurgy. A. B. Mindler. Paper from "Ion Exchange Technology", Academic Press Inc., p. 285-320.

Historical review, physical, chemical and process limitations, tabulated data on application to various hydrometallurgical problems, process development and new techniques. (B14)

215-B. (Czech.) **Making Cast Iron Using Granulated Iron.** Bohumil Kroupa. *Hutnik,* v. 6, no. 4, Apr. 1956, p. 117-118.

Iron granules or pellets are excellent for the manufacture of all types or raw irons. They contribute to the uniform quality and desulfurization of raw irons used for steelmaking. (B16, D general, Fe, ST)

216-B. The Concentration of Uranium From Low Grade Ores. T. V. Arden. *Industrial Chemist,* v. 32, May-June 1956, p. 202-209.

List of countries known to be producing uranium from low-grade ores. Physical and chemical methods of concentration, methods for recovering uranium from dilute and impure solutions. (B14, U)

217-B. (French.) **A Study of the Combustion of Coke in the Cupola.** Georges Ulmer. *Fonderie,* no. 125, June 1956, p. 232-237.

A study of means to improve efficiency of the cupola. A coke having a carbon monoxide content as low as possible is necessary and it should have high mechanical resistance. Dense, hard cokes are superior. (B18, E10)

C

Nonferrous Extraction and Refining

236-C. Development of Arc-Cast Molybdenum. Alvin J. Herzig. *Metal Progress,* v. 70, July 1956, p. 103-109.

Molybdenum-base alloys have become commercially available after a long and often discouraging development program. (C25, Mo)

237-C. High Vacuum, Everywhere in Industry. John H. Durante. *Research & Engineering,* v. 2, July 1956, p. 22-25.

Present and future applications. (C25, D8)

238-C. (Czech.) **The Significance of Preliminary Alloys in the Production of Alloys of Nonferrous Metals.** Adolf Valasek. *Hutnik,* v. 6, no. 5, May 1956, p. 140-144.

The effect of higher quality addition alloys in improving the quality of products made of nonferrous metals. Preparation of these alloys by direct heating, thermal reduction of the oxides of one of the component ores, electrolytic processes, and the reaction of a salt of one of the component ores.

(C general, B22, EG-a, Al, Cu)

239-C. (German.) **Preparation of Titanium Metal Through Its Sulfide.** Robert Schwarz and Alfred Köster. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 285, no. 1-2, May 1956, p. 1-4.

TiS_2 and Ti_2S_3 treated with various reduction agents such as hydrogen, calcium, calcium hydride, aluminum and magnesium. (C general, Ti)

240-C. (Italian.) **Continuous Casting—Production of Aluminum Rolled Wire Using The Properzi System.** U. Lecis. *Alluminio,* v. 25, no. 6, June 1956, p. 275-278.

Aspects of casting with the Properzi system and an analysis of results obtained. The electrical and mechanical characteristics of aluminum wire for electrical conductors. (C5, F28, P15, Q general, Al)

241-C. Refining Antimony by Electrodeposition and by Distillation. R. R. Rogers and R. A. Campbell. *Canada, Department of Mines and Technical Surveys, Mines Branch Technical Paper No.* 11, 1955, 14 p.

Crude antimony can be refined by distillation, by electrolytic means, or by a combination of these two methods. The degree of refinement varies with the proportions of impurities present, and the refining method used. (C22, C23, Sb)

242-C. An Electrolytic Method for the Direct Production of Magnesium Lithium Alloys From Lithium Chloride. J. Smolinski, J. C. Hannam and A. L. Leach. *Journal of Applied Chemistry,* v. 6, Apr. 1956, p. 187-196.

Made by electrolytic deposition of lithium onto a magnesium cathode from a molten 50% lithium chloride, 50% potassium chloride, or 75% lithium chloride, 25% barium chloride electrolyte at 560 to 630° C. (C23, Mg, Li)

243-C. The Isolation in Quantity of Individual Rare Earths of High Purity by Ion Exchange. F. H. Spedding and

J. E. Powell. Paper from "Ion Exchange Technology", Academic Press Inc., p. 359-390.

Theoretical aspects, small pilot plant experience, abundance, occurrence and uses for rare earths, design of an ion exchange separation plant. (C general, EG-g)

244-C. The Use of Chlorine in the Extraction of Metals for the Atomic Energy Programme. A. B. McIntosh. *Industrial Chemist,* v. 32, May-June 1956, p. 195-199.

Properties and history of chlorides of various metals suitable as nuclear fuels. Modern extraction methods using chlorine. (C4, T25)

245-C. Casting Wheel Cakes Copper for Continuous Strip. *Iron Age,* v. 178, Aug. 2, 1956, p. 94-95.

Vertical casting wheel allows production of 40 tons per hour of high grade, electrolytically pure copper in cakes weighing 2000, possibly 4000 lb. (C5, Cu)

246-C. An Investigation on the Function of Ingot Mould Dressings. D. R. Thornton. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 300-315.

The volatile dressings offer most advantage, bituminous paint appearing to be the best. Coal tar and charcoal-based dressings are almost as effective in reducing surface defects, but are more difficult to use. (C5, D9)

247-C. (Russian.) **Problem of the Reduction of Columbium Pentoxide and Tantalum Pentoxide by Hydrogen.** A. V. Lapitskii, Iu. P. Simanov and E. P. Artamonova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 4, 1956, p. 641-649.

Variation in results, depending on previous heating and on reduction temperatures. Effect of rate of gas flow on the intensity of reduction, reduction of the two pentoxides separately and as mixtures, effect of composition of the mixtures. (C2, Ta, Cb)

248-C. (Russian.) **Ridding Columbium of Accompanying Titanium by Means of Cationites.** S. I. Solov'ev, E. I. Krylov and L. P. Kononova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 4, 1956, p. 660-663.

Method of separation is based on the ability of freshly precipitated columbic acid, after treatment with concentrated hydrochloric acid, to become a colloidal solution that is not adsorbed by the cationite, whereas the titanium and other impurities are eliminated by means of ion-exchange adsorption. (C general, Cb, Ti)

249-C. (Book.) **Ion Exchange Technology.** F. C. Nachod and Jack Schubert, editors. 660 p. 1956. Academic Press, 125 E. 23rd Street, New York 10, N. Y. $15.00.

Fundamental problems, techniques, and operations of ion exchange such as mass transfer, equipment design, properties of ion exchange resins, and deionization. (C general, B14, A8)

D

Ferrous Reduction and Refining

287-D. Some Aspects of Blast Furnace Operation. E. H. Baldwin. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 740-746.

Coke quality, sinter quality, scrap charging, furnace temperature and sulfur control. (D1)

288-D. Desulphurization of Basic Iron With Calcium Carbide. E. J. Whittenberger, A. J. Deacon and L. C. Hymes. *Blast Furnace and Steel Plant,* v. 44, July 1956, p. 747-754.

Desulphurization by ladle injection of calcium carbide entrained in a nitrogen gas stream is a reproducible and dependable process. Higher initial sulfur contents and iron temperatures significantly increase efficiency. (D9, Fe)

289-D. H-Iron: Competition for the Blast Furnace? P. M. Unterweiser. *Iron Age,* v. 178, July 12, 1956, p. 71-74.

The H-Iron process directly reduces iron ore fines with hydrogen, efficiently and cheaply. The end product, metallic iron, suits both openhearth and electric furnaces. (D8, Fe)

290-D. Bright Future Seen for Vacuum Investment Castings. F. Kenneth Iverson. *Iron Age,* v. 178, July 19, 1956, p. 120-122.

Growing number of high-temperature applications demands unique alloys with top heat resisting properties. Tests show that vacuum investment castings may be better than wrought products in some areas, but furnace cost is a problem. (D8, E15)

291-D. (French.) **Recent Developments in the Continuous Casting of Steel.** *Métallurgie,* v. 88, no. 5, May 1956, p. 459-467.

New developments in the metallurgical, technical and economic aspects of continuous steel casting. (D9, ST)

292-D. (Polish.) **The Effect of Drying and Starting Blast Furnaces on the Life of the Lining.** Aleksander Maslanka and Rowman Stec. *Wiadomosci Hutnicze,* v. 12, no. 6, 1956, p. 166-173.

Prolonging the life of furnace linings by proper drying and start-up procedures. Continuous observation of the operating temperature of lining by means of thermocouples. (D1, S16)

293-D. (Russian.) **Intensification of Steel Melting With the Aid of Oxygen.** G. A. Podoloskaia and V. A. Makovskii. *Metallurg,* no. 6, June 1956, p. 17-19.

A recently developed method of intensifying melting with the aid of oxygen introduced both into the fuel and into the bath. (D2, ST)

294-D. (Russian.) **Experimental Melting of Chromium-Nickel Steel From a Charge With Lower Than 1.50% Cr Content.** P. K. Morokov and B. G. Petukhov. *Metallurg,* no. 6, June 1956, p. 20-23.

Experimental melting of Cr-Ni steels from charges with a low chromium content shows that such melting does not complicate the technological process, does not lower the grade of the metal and appears to be economically feasible. (D2, AY)

295-D. (Spanish.) **Modern European Technology in the Construction of Open-Hearth Furnaces.** Franz Bartu and Hueimo Leopold. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 386-403; disc., p. 403-404.

Construction of different parts of the furnace; use of modern suspension systems; installation of modern auxiliary equipment; measuring and control apparatus. (D2)

296-D. (Spanish.) **The Demag-Humboldt Process in the Low-Shaft Blast Furnace.** Hans Reinfeld. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 485-511.

Beneficiation process by low-temperature distillation, based principally on beneficiation by a single-phase distillation. (D1, B14, ST)

297-D. (Spanish.) **Ladle Prerefining With Oxygen of Castings Very Rich in Silicon.** Pierre Leroy and Dimas Menendez Magdalena. *Instituto del Hierro y del Acero,* v. 9, no. 46, May 1956, p. 548-560.

Ladle prerefining with pure oxygen done in France with cast irons containing 0.50 to 1% silicon can also be applied to certain Spanish cast irons containing 2 to 3% silicon. (D9, Fe, CI)

298-D. Steelmaking Developments During the Past Decade. Karl L. Fetters. *Industrial Heating,* v. 23, July 1956, p. 1429 + 5 pages.

Better production with existing facilities has accounted for 20% of the production gain. Some of the practices responsible for this increase are reviewed. (D general, ST)

299-D. Automatic Control of Continuous Casting of Steel in Russia. L. K. Tatochenko. *Instrument Praotice,* v. 10, June 1956, p. 518-519. (From *Stal,* Mar. 1956, p. 212.)

Gamma radiation devices are used for controlling the level of liquid metal in the mold. (D9, S19, ST)

300-D. Lesson in Electrodes. *Steel,* v. 139, July 23, 1956, p. 86, 88.

How to get the most out of electric furnace electrodes. The payoff is better melt shop performance. (D5)

301-D. Hot Tops Increase Ingot Yield. *Steel,* v. 139, July 30, 1956, p. 100.

An exothermic hot top composition improves yield 3 to 10%, means less segregation in the ingot, and less splintering. (D9, ST)

302-D. (French.) **A Study on a Reduced Pattern of the Aerodynamics of a Gas-Preheated Maerz Openhearth, and Comparison with a Siemens and a Terni Hearth.** G. Husson, G. Cohen de Lara and R. Durand. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 411-425.

Results obtained with a Maerz hearth. (D2, ST)

303-D. Continuous Casting of Steel. Isaac Harter, Jr. *Iron and Steel Engineer,* v. 32, Apr. 1956, p. 58-61; disc. p. 61-62.

Increased yield, reduced segregation, high surface quality and low capital investment are important features. (D9, ST)

304-D. Modern European Hot Blast Changing Equipment. Herman Jansen. *Iron and Steel Engineer,* v. 33, July 1956, p. 137-143.

Features complete mechanization of reversal, centralization of supervision, high efficency burners and short reversal times. (D1)

305-D. Blast Furnace Oxygen Operations. Julius H. Strassburger. *Iron and Steel Engineer,* v. 33, July 1956, p. 154-158.

Oxygen plant operation and the use of oxygen for the enrichment of the blast for blast furnace operation. (D1, ST)

306-D. Use of Oxygen to Increase the Rate of Refining in Steelmaking. H. Kosmider. *Henry Brutcher, Translation No.* 3709, 15 p. Henry Brutcher, Altadena, Calif. (Abridged from *Stahl und Eisen,* v. 75, no. 22, 1955, p. 1433-1439.)

Advantage of processing preblown pig iron in openhearth furnace. Converter blowing time and converting rate as depending on volume of oxy-

gen supplied per unit time and on oxygen enrichment of blast. (D2, ST)

307-D. (German.) **Comparative Observation of the Oxygen Converter Process with the Classic Steel Production Method.** A. Legat. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 22, no. 6, June 1956, p. 200-203.

Comparison of physico-chemical characteristics. The low phosphorus and sulfur contents of oxygen-converter steel constitute a particular quality factor. (D2, D8, ST)

E

Foundry

410-E. The Influence of Mould Variables and Inhibitors on Mould Reaction in Aluminium-10% Magnesium Alloy. Marjorie Whitaker. *Institute of Metals, Journal*, v. 84, June 1956, p. 351-356.

The reaction can be reduced by avoiding coarse sand and ramming the mold as hard as is consistent with adequate permeability and other necessary characteristics. (E19, Al)

411-E. Shell-Moulding Practice. D. F. Bailey. *Metal Industry*, v. 88, June 29, 1956, p. 544-547.

Methods of manufacturing coated sands; runner systems; vertical and horizontal pouring; shell assembly. (E16)

412-E. (Czech.) **Experiences With the Use of Chemically Hardened Molding Mixtures in the Steel Foundry of Vitkovice Iron Works.** Artur Koval. *Slévarenstvi*, v. 4, no. 6, June 1956, p. 177-182.

Principles and practices in the use of chemically hardened sands for the production of large castings. (E18)

413-E. (Czech.) **Dies for Metal Casting.** Josef Sebl. *Slévarenstvi*, v. 4, no. 6, June 1956, p. 182-185.

Investigates choice of material for dies when metals are pressure cast, and principles for the determination of a gating system and venting of molds. Maintenance of dies is outlined, together with possibilities for reducing mold production costs. (E13)

414-E. (Czech.) **Types of Tears in Castings and Conditions Influencing Their Formation.** Josef Pribyl. *Slévarenstvi*, v. 4, no. 6, June 1956, p. 185-191.

Tears in castings can be attributed to either the base conditions influencing the origin of tension in castings in the dangerous temperature range, or to the secondary causes consisting of local or total lower material strength in castings. (E general, Q23)

415-E. (Dutch.) **The Lining of Acid Cupola Furnaces.** A. Bordes. *Metalen*, v. 11, no. 9, May 15, 1956, p. 197-202.

Factors affecting the durability of the lining in the melting zone; design of the furnace; comparison of various lining materials. (E10, B19, CI)

416-E. (French.) **Sofal Casting in A-S10G of a 1040-Kg. Crankcase for a Diesel Engine.** Charles Roinet. *Revue de l'Aluminium*, v. 33, no. 232, May 1956, p. 471-480.

Required a special molding study; pouring procedure described. (E11, Al)

417-E. (Hungarian.) **Experiments on Gray Cast Irons to Improve Their Quality by Double Inoculation.** Ferenc Varga and Kazmér Janossy. *Ontöde*, v. 7, no. 5, May 1956, p. 112-115.

Possibilities for improving the strength characteristics, increasing the reproducibility and identifying the carbide-stabilizing and graphite-forming materials most suitable for inoculation. (E25, CI)

418-E. (Polish.) **Production of Castings of Spheroidal Cast Iron Using Magnesium Additions in the Form of Rods.** Alojzy Jankowski. *Przeglad Odlewnictwa*, v. 6, no. 5, May 1956, p. 131-139.

Chemical composition of the cast iron, composition of charge for cast iron, apparatus for introducing magnesium rods into the melt, heat treatment of the castings, structural properties and strength characteristics before and after annealing and casting apparatus. (E10, E25, J general, Q23, CI)

419-E. (Swedish.) **Grain Refining in Cast Aluminum Alloys.** T. Malmberg, G. Coyet and G. Wardell. *Gjuteriet*, v. 46, no. 4, Apr. 1956, p. 45-52.

A titanium alloy and one containing titanium and boron generally had the best effect, but for an aluminum alloy rich in silicon only a zirconium alloy was effective. No improvement in tensile strength was found except for the duralumin test bars cast in dry sand molds. (E25, Q23, Al)

420-E. (Swedish.) **Degassing of Aluminum by Gas Bubbling.** M. Tikkanen and E. Erkko. *IVA Tidskrift för Teknisk-Vetenskaplig Forskning*, v. 27, no. 3, 1956, p. 96-102.

Merits and drawbacks of nitrogen and chlorine as reducing gases. (E25, Al)

421-E. Melting by Induction. I. Low Frequency Furnace Applications. Frank T. Chesnut. *Industrial Heating*, v. 23, July 1956, p. 1377-1378, 1380, 1382.

Types of induction melting furnaces. Applications to copper, zinc, aluminum, and cast and malleable iron. (To be continued.) (E10, Cu, Al, Zn, CI)

422-E. New Furnaces and Humidity Control Equipment in Mechanized Foundry Improve Quality of Iron Castings. *Industrial Heating*, v. 23, July 1956, p. 1410 + 4 pages.

Combination of modern heating equipment and hot blast and humidity control has resulted in significant benefits. Improved control of variables has led to greater uniformity of composition and more uniform annealing, resulting in castings which have structures more favorable to machinability. (E10, J23, G17, CI)

423-E. Use of Refractories in Low-Frequency Induction Furnaces for Melting Copper Alloys. III. Maurice Cook, C. L. M. Cowley and E. R. Broadfield. *Industrial Heating*, v. 23, July 1956, p. 1477 + 9 pages.

Discussion of lining life with causes for shorter life categorized according to failure through faulty construction or improper furnace operation. (E10, Cu)

424-E. Pocket Type Unit Diecasting Dies. *Mechanical World and Engineering Record*, v. 136, July 1956, p. 310-311.

Use of interchangeable cavity blocks housed like core-slides in pockets running to the edge of the bolster members greatly facilitates removal and replacement in the unit-die system described. (E13)

425-E. Big Castings Build a Business. *Steel*, v. 139, July 30, 1956, p. 104, 106.

Million-dollar foundry for big cement mold iron castings is mechanized to a degree that produces efficiency and economy without loss of versatility. (E11, CI)

426-E. Chambersburg Engineering Foundry Specializes in Large Precision Castings. Fred Mueller. *Steel Processing*, v. 42, July 1956, p. 393-395, 414.

Plant layout and operation of modern foundry. (E11)

427-E. (Czech.) **Manufacture of Cast-Iron Water Pipe** Vratislav Cap. *Hutnik*, v. 6, no. 4, Apr. 1956, p. 98-102.

Survey of casting methods, from the oldest to the most up-to-date, including specific problems of pouring techniques, cooling methods, types of heating furnaces and casting equipment. (E general, CI)

428-E. (Czech.) **Manufacture of Synthetic Sand Cores for Permanent Molds.** Miloslav Sourek. *Hutnik*, v. 6, no. 4, Apr. 1956, p. 102-105.

Materials and material costs, compositions and methods of preparing mixtures for core sands, effect of use of synthetic sand cores on service life of permanent molds. (E21, E18, E12)

429-E. (German.) **Beryllium in the Melting of Aluminum.** E. Nachtigall and H. Landerl. *Aluminium Ranshofen, Mitteilungen*, v. 4, no. 1, Apr. 1956, p. 15-18.

Advantages of small additions of beryllium to pure aluminum and to aluminum-magnesium alloys include reduced magnesium losses in melting alloys, elimination of the bad effect of mold moisture on the cast metal, improved coatings on dip-aluminized iron. (E10, E25, L16, Mg, Be, Al)

430-E. (Polish.) **Special or Usual Methods of Molding?** Platon Januszewicz. *Przeglad Odlewnictwa*, v. 6, no. 6, June 1956, p. 165-173.

Methods and amount of deviation from original dimensions, and specific uses and properties of various types of molds. Shell molding, high-pressure molding, plaster-casting, precision investment casting (including glass molds), and other mold materials and casting methods compared. (E general)

431-E. (Polish.) **Materials for Making Shell Molds: Properties, Supply Sources, and Preparation.** Zdzislaw Hertz and Jan Harpula. *Przeglad Odlewnictwa*, v. 6, no. 6, June 1956, p. 173-175.

Materials, such as sands and resin, for shell-mold making; separating and moistening media; methods of making molds; official standards for their use per ton of cast iron. (E18, E16, CI)

432-E. (Polish.) **The Status of Automation in Mold Mixture Processing.** Zdzislaw Izykowski. *Przeglad Odlewnictwa*, v. 6, no. 6, June 1956, p. 175-178.

Present state of mechanization and indicated trends in mixing and other operations. (E19)

433-E. (Portuguese.) **Notes on Precision Casting.** Lino A. De Lacerda Santos. *ABM (Boletim da Associacao Brasileira de Metais)*, v. 12, no. 43, Apr. 1956, p. 105-115.

Precision casting by the lost-wax process, different phases from point of view of materials that can be used in Brazil. (E15)

434-E. (Portuguese.) **Molding of a Large Piece Cast in Steel.** Roberto

Carlos Taralli. *ABM (Boletim da Associacao Brasileira de Metais)*, v. 12, no. 43, Apr. 1956, p. 117-124.

Molding technique, solution of difficulties arising from a lack of specialized molders. (E19, E11, CI)

435-E. (Portuguese.) **Manufacture of Chill-Cast Iron Rolls Using an Electric Furnace.** Carlos Passeggio. *ABM (Boletim da Associacao Brasileira de Metais)*, v. 12, no. 43, Apr. 1956, p. 125-133.

Equipment and operating procedures in Brazil. (E10, E11, E25, CI)

436-E. Patterns for Torpedo Tubes. Richard J. Porter. *Foundry*, v. 84, Aug. 1956. p. 76-79.

Specialized pattern equipment for centrifugally cast torpedo tubes calls for careful advance design and planning. (E17, E14)

437-E. New Permanent Mold Line Increases Piston Production. Robert H. Herrmann. *Foundry*, v. 84, Aug. 1956, p. 70-75.

Operation of a revamped line containing 16 automatic machines, each capable of making 120 pistons per hr. (E12)

438-E. The Brass Foundry. XIII. Brass Casting Defects. Harry St. John. *Foundry*, v. 84, Aug. 1956, p. 88-91.

Analysis of ten defects. (E11, Cu)

439-E. Take a Fresh Look at Foundry Molding Sands. J. M. Anspach. *Foundry*, v. 84, Aug. 1956. p. 100-103.

Basic theory of molding sand properties and ability of auxiliary materials to modify these properties. (E19)

440-E. Indian Foundry Uses CO_2 Process to Advantage. C. A. Phalnikar. *Foundry*, v. 84, Aug. 1956, p. 140-142, 144, 146.

Sand practice, coremaking and moldmaking operations. Experience shows saving in time and reduction in defective castings. (E18)

441-E. Foundry Sand Practice. W. B. Parkes. *Iron & Steel*, v. 29, July 1956, p. 335-341.

A review of progress, 1939 to 1955. (E18, E19)

442-E. Pattern Dies for Investment Casting. D. E. Brooks. *Iron & Steel*, v. 29, July 1956, p. 349-352.

Pattern die types, factors affecting die design, die-making techniques. (E17, E15)

443-E. Layout and Design of Ingot Mold Foundries. Glenn W. Merrefield. *Iron and Steel Engineer*, v. 33, July 1956, p. 91-103; disc., p. 103-104.

Foundries must be designed to fit a number of conditions such as available area, metal, molding materials and many other factors in order to get economical production of molds. (E11, T5, CI)

444-E. What About Investment Cast Vacuum Alloys? F. Kenneth Iverson. *Modern Castings*, v. 30, Aug. 1956, p. 24-26.

Vacuum melting is moving from research lab to production to open fields for investment castings. Costs, production procedure and equipment details are discussed. (E10, E15, C25, D8)

445-E. More on Metal Flow in Molds. Goro Ohira. *Modern Castings*, v. 30, Aug. 1956, p. 28-29.

Tests were made concerning flow of metals in the runner and gates of test molds for aluminum cast at 750° F. (E22, Al)

446-E. The CO_2 Process. *Modern Castings*, v. 30, Aug. 1956, p. 33-48.

Survey of developments in North America and Great Britain. Use of carbon dioxide hardening for shell and other molds and cores. (E19, E21)

447-E. Aluminum Foundry Gets High Strength Without Heat Treatment. Arthur Van Newkirk. *Modern Castings*, v. 30, Aug. 1956, p. 56-57.

Heat treatment is eliminated by using new alloy, normal technique, standard equipment. (E11, Al)

448-E. Slip Casting of Stainless Steel Powder. I. W. G. Lidman and R. V. Rubin. *Precision Metal Molding*, v. 14, Aug. 1956, p. 40-41, 83.

Centrifugal casting was used in an investigation of the feasibility of applying slip casting techniques, using low metal content slips to powder metallurgy materials. (E14, H general, SS)

449-E. Shapes Unlimited. *Precision Metal Molding*, v. 14, Aug. 1956, p. 46-48, 66.

A precision casting method, using expendable patterns and monolithic molds, produces extremely complex nonferrous components with high accuracy. (E15)

450-E. When You Design Aluminum Bronze Permanent Mold Castings. Arthur Street. *Precision Metal Molding*, v. 14, Aug. 1956, p. 52-54, 76-77.

Characteristics, applications and design considerations. (E12, Al, Cu)

451-E. New Method of Impregnating. *Precision Metal Molding*, v. 14, Aug. 1956, p. 65.

Vacuum impregnation with a phenolformaldehdye bakelite solution salvages porous castings. (E25)

452-E. How to Control Temperature in Die Casting Dies. II. Causes of Thermal Unbalance. W. M. Halliday. *Precision Metal Molding*, v. 14, Aug. 1956, p. 73, 75.

Amount of heat transfer is a function of the time in which the flowing alloy is in direct contact with the die surfaces. (E13)

453-E. (French.) **The Effect of the Pouring Temperature on the Size of the Grain of Gray Cast Iron.** Michel Ferry and Jean-Claude Margerie. *Fonderie*, no. 125, June 1956, p. 223-231.

Size of the eutectic grain decreases with size of the piece and with a lower pouring temperature, except in irons of very low silicon content. Lowering the pouring temperature affects the surface grain more than interior grain. (E25, E23, CI)

454-E. (German.) **The Mechanism of Diminution of Grain in Aluminum Alloys.** M. V. Mal'tsev. *Liteinoe Proizvodstvo*, no. 6, June 1956, p. 18-21.

Experimental data showing that the diminution of grain in aluminum and its alloys artef adidtion of small amounts of transition metals is due to formation of high-melting particles of intermetallic compounds acting as nuclei in the crystallization of the solid solution. (E25, Al)

455-E. (Russian.) **Manufacture of Castings for Piston Rings.** A. A. Svarika. *Liteinoe Proizvodstvo*, no. 6, June 1956, p. 3-4.

A method of manufacturing castings for piston rings from siliconmanganese cast iron. Best results were achieved by adding up to 30% scrap steel to the latter. (E general, T7, CI)

456-E. (Russian.) **Methods of Pressure Treatment of Metal in the Liquid and the Plastic State and the Outlook for Their Further Development.** V. M. Pliatskii. *Liteinoe Proizvodstvo*, no. 6, June 1956, p. 7-11.

A general survey of casting methods employing stepwise pressing and pouring as well as extrusion under pressure. Processes involved and equipment used. (E general, F24)

457-E. (Book.) **Casting Kaiser Aluminum.** 376 p. 1956. Kaiser Aluminum & Chemical Sales Inc., 919 North Michigan Boulevard, Chicago 11, Illinois.

Pig and ingot product data, principal casting methods, and characteristics of molten aluminum. Glossary of terms common to aluminum and its castings. (E general, C5, A10, Al)

F

Primary Mechanical Working

177-F. New Rod Mill Rated at Annual Output of 450,000 Tons. *Blast Furnace and Steel Plant*, v. 44, July 1956, p. 737-739, 746.

Mill consists of 25 roll stands, simultaneously produces four lines of rods at more than mile-a-minute speeds, and can roll all sizes of rods from 0.218 in. up to 1½ in. in dia. (F27, ST)

178-F. (Czech.) **The Manufacture of Welded Pipe.** Adolf Bijok. *Hutnik*, v. 6, no. 5, May 1956, p. 135-137.

With welded pipe replacing seamless rolled pipe, various welding methods are applicable. Speed of resistance welding is increased by using currents of higher frequencies. Inductive welding of thin-walled pipe and some of its problems are cited. (F26, K3, K6)

179-F. (Polish.) **Analysis of the Phenomena at Any Point Between the Rolls With the Occurrence of Spread.** Zygmunt Wusatowski. *Archiwum Hutnictwa*, v. 1, no. 2, 1956, p. 141-169.

Formulae derived for determining the coefficient of spreading during the hot rolling of steel make it possible to accurately determine the way the metal flows during spreading. (F23, ST)

180-F. (Russian.) **Use of Phosphate Coating in Cold Drawing of Tubing.** M. A. Freiberg. *Metallurg*, no. 6, June 1956, p. 31-34.

Advantage of phosphate over copper coating as an aid in drawing steel tubing. (F26, F1, ST)

181-F. Computer Control of a Rolling Mill Schedule. A. H. Kuhnel. *Instruments and Automation*, v. 29, July 1956, p. 1303-1305.

A special-purpose computer applied to rolling mill operation. (F23, S18, ST)

182-F. High Purity Titanium Wire. *Modern Metals*, v. 12, July 1956, p. 72.

Employing the consumable electrode arc melting process in vacuum, new producer makes ductile wire for welding uses and product applications. (F28, C25, Ti)

183-F. The Rolling of Metals and Alloys. XII. The Productive Capacity of Strip Mills. E. C. Larke. *Sheet Metal Industries*, v. 33, no. 351, July 1956, p. 495-500.

Influence of certain factors on the productive capacity. A method of computing the effective tonnage rolled per hour and the time needed to complete a rolling schedule. (F23, A5)

184-F. Basic Forging Concepts. II. Forging Materials. Lester F. Spencer. *Steel Processing*, v. 42, July 1956, p. 387-392, 418.

Resume of the characteristics of the more important alloys suitable for forging.
(F22, Mg, Cu, Al, CN, AY)

185-F. AS&W Places New Rod Mill in Operation at Its Cuyahoga Works. *Wire and Wire Products,* v. 31, July 1956, p. 765-766, 810-811.

This new Morgan mill has a capacity 25% greater than the two old mills it replaces. (F23)

186-F. (Czech.) **Formation of Flakes in Forged Pieces During Cooling and Their Removal.** Rudolf Hrivnak. *Hutnik,* v. 6, no. 3, Mar. 1956, p. 71-76.

Effect of cooling methods on formation of flakes. Heating of forged piece between preforming and other forging stages to eliminate flaky structure. Cooling, interforging heating and forging forces in relation to microstructure and forging ratio. (F22, M27, F21, ST)

187-F. (Polish.) **Mechanization of Forging Operations.** Edward Decowski. *Wiadomosci Hutnicze,* v. 12, no. 5, May 1956, p. 147-151.

Machines and methods for mechanizing cutting, loading, lifting, transporting and removing of forged or pressed pieces from the forging, stamping or pressing machines. (F22, F29, G3, A5)

188-F. New Sendzimir Mill Rolls Extra-Wide Sheet. *Iron Age,* v. 178, Aug. 2, 1956, p. 92-93.

King-sized mill rolls stainless grades in widths up to 50 in., holding thickness tolerances to ± 3%. (F23, SS)

189-F. Modernizing the Hot and Cold Strip Mills at Bethlehem's Lackawanna Plant. F. S. Eckhardt. *Iron and Steel Engineer,* v. 33, July 1956, p. 55-63; disc., p. 63-65.

Some details of a 20-yr. modernization program which increased hot mill capacity over four times and cold mill capacity almost eight times. (F23, ST)

190-F. Heating Heavy Sections—How Fast? Quentin M. Bloom. *Iron and Steel Engineer,* v. 33, July 1956, p. 66-74; disc., p. 74-77.

Some recent applications of high-speed heating of heavy sections illustrate the merits of high-speed furnaces as a steelmaker's tool. (F21, J general, ST)

191-F. Replacement of Inland's No. 2 Blooming Mill. A. L. Schroeder. *Iron and Steel Engineer,* v. 33, July 1956, p. 130-136.

Through careful planning and scheduling, the mill was rebuilt with total down time of 23 days and 45 min., with excellent production obtained in a very short time. (F23, ST)

192-F. Principles of a Metallurgically and Physically Balanced Hot Strip Mill. M. Alexander Leishman. *Iron and Steel Engineer,* v. 33, July 1956, p. 144-148.

Relationships were derived which enable optimum coil lengths and weights to be calculated for metallurgically balanced operations. (F23, ST)

193-F. Copper Tube Production. Federico Hruska. *Metal Industry,* v. 89, July 13, 1956, p. 23-26, 32.

Operation of a modern Chilean tube mill. (F26, Cu)

194-F. Rapid Heating of Small Forgings. J. E. Russell. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 251-256.

Advantages of efficient heating include lower fuel consumption, shorter furnace times and reduced scaling and decarburization. (F21, F22, ST)

195-F. (Polish.) **The Longitudinal Fluidity of Metal in the Deformation Zone.** Waclaw Leskiewicz. *Hutnik,* v. 23, no. 5, May 1956, p. 202-207.

Behavior of metal while going through the rolls. Review of previous work on the subject. Graphs of relationships of forward flow and temperature. Pressure distribution and forward flow. Formula expressing relation between forward flow and spread. (F23, Q24)

196-F. (Polish.) **The Calculation of Temperature Drop in Various Rolling Passes.** Edward Decowski. *Hutnik,* v. 23, no. 5, May, 1956, p. 216-219.

Formulas for calculating heat losses in the rolling process include the following factors; heat loss due to heat radiation, convection currents and the difference in temperature between rolls and hot metal, and heat produced during deformation of the metal in the rolls. (F23)

G
Secondary Mechanical Working

277-G. On the Tool-Life and Temperature Relationship in Metal Cutting. F. F. Ling and Edward Saibel. *ASME, Transactions,* v. 78, July 1956, p. 1113-1116; disc., p. 1116-1117.

Cutting-tool failure is viewed essentially as a rupture process and the data relating tool life and cutting temperature are interpreted from a reaction-rate theory point of view. (G17)

278-G. The Mechanism of Crater Wear of Cemented Carbide Tools. K. J. Trigger and B. T. Chao. *ASME, Transactions,* v. 78, July 1956, p. 1119-1126; disc., p. 1126.

Analysis of tool wear data in terms of fundamental variables consistent with the nature of the contact and rubbing of clean metallic surfaces. (G17, Q9, C-n)

279-G. Cleanliness, Flow Control Boost Coolant Efficiency. J. E. Hyler. *Iron Age,* v. 178, July 19, 1956, p. 112-114.

Coolant cleaners, refrigerators and special flow-control devices are worth-while aids to efficient, low-cost machining and grinding. Most are versatile, can be adapted to practically any type of metal cutting or grinding equipment. (G21)

280-G. Metal Cutting Measurements and Their Interpretation. E. G. Loewen and N. H. Cook. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 57-62.

Design of modified rings for use with electric resistance strain gages. Examples of the practical use of force measurements. (G17, Q25)

281-G. Lubrication in Drawing. II. Materials and Application. Eugene D. Viers. *Steel,* v. 139, July 16, 1956, p. 148-150, 152.

Single stage and multistage forming operations. Methods of applying lubricants. (G4, G21)

282-G. Tubular Fabrication. III. A. Scott. *Welding and Metal Fabrication,* v. 24, July 1956, p. 253-255.

Changing the contour of the tube, drilling, machining, milling and painting. (To be continued.) (G general, L26)

283-G. (Czech.) **Machining by Means of Ultrasonic Vibrations.** *Strojirenska Vyroba,* v. 4, no. 5, May 1956, p. 199-201.

Ultrasonic transducer for machining a variety of materials. Physical principle of magnetostriction, construction of a magnetostrictive vibrator. (G17)

284-G. (French.) **Studies on Estimating the Stamping Ability of Thin Sheets From Laboratory Tests.** M. Jentet. *Metallurgie,* v. 88, no. 5, May 1956, p. 479-489.

Compares various characteristics of a sheet, obtained by laboratory tests, with a simple stamping, and investigates, by studying the correlation between the results, the characteristic which best enables estimating the stamping ability of the sheet. (G3)

285-G. (German.) **Effect of Heat Treatment on the Machinability of Case Hardened and Improved Steel.** *Archiv für das Eisenhüttenwesen,* v. 27, no. 6, June 1956, p. 381-400.

Results of long-time torsion testing of two different melts of various alloy steels. Dependence of the tool life behavior and the realization of surface quality by heat treatment of the workpiece. (G17, J23, Q1, AY)

286-G. (Hungarian.) **Hot and Cold Working of "Nautal", With Special Consideration to the Resistance of Forming.** Zoltan Buray. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 232-235.

Laboratory and pilot plant experiments led to the development of the Al-Mg 4.5-Mn 0.4 alloy designated as "Nautal". Hot and cold forming experiments. Rolling and deep drawing data. (G general, F23, Al)

287-G. Steel Hardness Doesn't Bother the Friction Saw. J. E. Hyler. *Iron Age,* v. 178, July 26, 1956, p. 72-74.

At high speeds, heat of friction softens a small area of the workpiece. Blade literally wipes this metal out of the cut, providing fast, efficient cutting. (G17, ST)

288-G. Some Investigations Into the Deep Drawing and Spinning of Non-Ferrous Metals. John A. Grainger. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 461-473, 486.

Reference to a number of tests conducted on a cupping press to assess the efficiency of certain lubricant systems. (To be continued.) (G4, G13, G21, EG-a)

289-G. Press Brakes and Their Tools. V. John Waller. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 475-478, 486.

Methods of piercing holes with standard unit tools. (To be continued.) (G2)

290-G. The Design of Interchangeable Die Inserts for Universal Piercing Tools. W. M. Halliday. *Sheet Metal Industries,* v. 33, no. 351, July 1956, p. 487-493, 500.

Various methods of constructing universal-type piercing tools. (G2)

291-G. Success Out of Failure. III. Lubrication in Drawing. Eugene D. Viers. *Steel,* v. 139, July 23, 1956, p. 94-96, 98.

Ten essentials of a drawing lubricant. (G4, G21)

292-G. Rolling Mill for Roofs and Floors. *Steel,* v. 139, July 30, 1956, p. 96-98.

Three cold roll-forming mills and a huge finishing machine feed a soaring market in cellular metal roof and floor sections. (G11)

293-G. Rubber Forming Gains Accuracy. *Steel,* v. 139, July 30, 1956, p. 109.

A variation of rubber forming called compression forming is producing more accurate parts for supersonic aircraft. Method utilizes the plastic range of metal grains to reduce springback. (G8, Al)

294-G. Ceramic Tools in Production and in the Laboratory. Robert T. Hook. *Tool Engineer,* v. 37, Aug. 1956, p. 101-104.

Characteristics of sintered aluminum oxide tools; rules developed from experimental and production experience. (G17)

295-G. Tungsten Carbide Dies for Punching Armature Laminations. W. A. Fletcher. *Tool Engineer,* v. 37, Aug. 1956, p. 78-81.

Production of laminations by steel and by carbide dies compared. (G2, C-n, W)

296-G. Machine Tool Requirements of the Future. Milton C. Shaw. *Tool Engineer,* v. 37, Aug. 1956, p. 105-111.

Machining cost, recent cutting tool developments, problems of increased speed and power, automatic control, nonchipforming processes. (G17)

297-G. Grinding Tap and Die Chasers. *Tool Engineer,* v. 37, Aug. 1956, p. 117-118.

Tables show recommended chamfer angles and chasing lubricants. (G18)

298-G. Refinery Equipment Requires Quality Oxy-Acetylene Cuts for Weld Preparation. C. B. Robinson. *Western Metals,* v. 14, July 1956, p. 52-54.

Fundamental requirements, basic cutting procedure, guide to proper cutting technique. (G22)

299-G. Break Production Records With Leaded Steels. T. M. Rohan. *Iron Age,* v. 178, Aug. 2, 1956, p. 83-85.

Leaded steels have extraordinary machining properties and contribute to over-all product quality improvement. (G17, Pb, ST)

300-G. Drawn Parts: Save Through Simplified Design. Federico Strasser. *Iron Age,* v. 178, Aug. 2, 1956, p. 88-91.

Some production-slanted tips aimed at overcoming some of the tougher drawing problems. (G4)

301-G. Metal Stampings. Federico Strasser. *Iron & Steel,* v. 29, July 1956, p. 343-347.

Some methods for saving material. (G3)

302-G. Dimpling Stainless-Steel Foil. J. E. Hagins. *Machinery,* v. 62, Aug. 1956, p. 156-158.

Rejects from cracks and wrinkles vanish and heat radiation factor is doubled. (G2, SS)

303-G. Hot Forming Titanium. L. Deane Noble. *Modern Machine Shop,* v. 29, Aug. 1956, p. 104-107.

Use of titanium in the manufacture of bomber outboard wing slats. (G1, Ti)

304-G. Essential Elements of Thread and Form Rolling. II. Clifford T. Appleton. *Modern Machine Shop,* v. 29, Aug. 1956, p. 110-117.

Types of equipment available for thread rolling. (To be continued.) (G12)

305-G. How We Grind Powdered Steel Gears to 4-6 Microinches. Arthur Roberts. *Precision Metal Molding,* v. 14, Aug. 1956, p. 59-60, 62, 64.

Some features of the grinding operations. (G18, G19, ST)

306-G. (French.) Some Physico-Chemical Aspects of Cutting With Oxygen. II. Claude Decroly and Guy Genin. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 130-138.

Ignition temperature was only slightly affected by the rate of discharge of the oxygen, but was reduced by adding aluminum and iron. These agents make it possible to economize on oxygen. (G22, ST)

H
Powder Metallurgy

111-H. Titanium Parts Made by Powder Metallurgy Methods. George J. Wile. *Materials & Methods,* v. 44, July 1956, p. 95-97.

By using press forming and hot pressing techniques to replace forgings in the manufacture of jet engine bearing housings, waste is reduced and production costs lowered by as much as 25%. (H14, Ti)

112-H. (Czech.) Technology and Properties of Materials Manufactured by Powder Metallurgy. M. Petrdlik. *Strojirenska vyroba,* v. 4, no. 3, Mar. 1956, p. 101-105.

Manufacture of metal powders, including processing, mixing, pressing and compacting. Sintering furnaces and other equipment. Strength and wear properties of bearings made of sintered metals. Other products. Large-scale production problems and economics.
(H general, Ay, Fe, Cu, Q23, Q9)

113-H. (Dutch.) Copper and Copper Alloys. XVII. Powder Metallurgy Data as It Applies to Copper and Copper Alloys. W. G. R. de Jager. *Metalen,* v. 11, no. 9, May 15, 1956, p. 203-207.

Chemical properties of metal powders, gaseous impurities, commercially available copper powders, powders produced electrolytically by copper oxide reduction and by atomization. (H10, H11, Cu)

114-H. (Dutch.) Copper and Copper Alloys. W. G. R. de Jager. *Metalen,* v. 11, no. 11, June 15, 1956, p. 246-247.

Estimation of the quality of metal powders. Packaging, mixing of metal powders with nonmetallic substances. (H11, H12, Cu)

115-H. (French.) New Developments of Powder Metallurgy in the Field of High-Temperature Materials. R. Meyer. *Métaux, Corrosion-Industries,* v. 31, no. 369, May 1956, p. 219-232.

Study of titanium carbide, chromium boride and zirconium boride cermets, molybdenum silicide and nickel aluminide. (H general, SG-h)

116-H. (German.) Silver-Cadmium-Base Materials for Electrical Contacts and Their Heat Treatment. H. Spengler. *Metall,* v. 10, no. 13-14, July 1956, p. 628-632.

Compares manufacture of silver-cadmium oxide electric contact materials, by powder metallurgy and by internal oxidation, giving preference to the latter method. Discusses, on the basis of experimental data, the mechanism of internal oxidation of silver-cadmium alloys, its influence on the properties and the structure of the alloys, and the relationship between the hardness and the grain size of cadmium oxide crystals.
(H general, J2, SG-r, Ag, Cd)

117-H. Sintered Components. *Automobile Engineer,* v. 46, July 1956, p. 268-275.

Rapid and economical production of intricate structural or working parts by powder metallurgy techniques. (H general)

J
Heat Treatment

199-J. Reduce Gear Distortion With Mass Marquenching. E. A. Schoefer. *Iron Age,* v. 178, July 19, 1956, p. 107-109.

A new carburizing and heat treating installation combines maximum part quality with a minimum of distortion. Carburizing is achieved in a closely controlled gas atmosphere to provide optimum carbon gradient. (J26, ST)

200-J. Cored Inductors for Induction Heating. II. D. Warburton Brown. *Machinery Lloyd (Overseas Ed.),* v. 28, June 23, 1956, p. 70-71, 73-76.

The use of cored inductors in various methods of hardening. (J2)

201-J. Enhanced Properties in 17-7 Stainless. M. W. Marshall, D. C. Perry and N. R. Harpster. *Metal Progress,* v. 70, July 1956, p. 94-98 + one data sheet.

High strength-weight properties of 17-7 stainless steel with aluminum, hardened partially by martensitic transformation at −100° F. and further by aging at 950° F., are very useful for aircraft and missile parts working up to 800° F.
(J26, J27, SS)

202-J. Control of Controlled Atmospheres. D. J. Schwalm. *Metal Progress,* v. 70, July 1956, p. 99-102.

Measurement of the carburizing potential of furnace atmospheres is more accurate if infra-red analysis of carbon dioxide is used.
(J2, S11)

203-J. (Czech.) New All-Purpose Machine for Surface Flame Hardening. New Techniques. Jar. Gabriel. *Strojirenska vyroba,* v. 4, no. 4, Apr. 1956, p. 157-161.

Advantages of surface hardening and range of application. Description and uses of new machine, its advantages over previous flame-hardening methods and apparatus. (J2)

204-J. (Hungarian.) The Degree of Dissociation of Ammonia Gas in Nitriding Processes. Tiborné Tömöry. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 199-206.

Influence of catalysts on the dissociation. Modification of the properties of the nitrided layer by varying the composition of the gas mixture. (J28)

205-J. Practical Aspects in the Heat Treatment of High-Alloy Tool Steels. C. J. Thompson. *Australasian Engineer,* v. 48, May 1956, p. 50-55.

Annealing, hardening and tempering, special treatments.
(J general, TS)

206-J. Temperability of Steels. Leonard D. Jaffe and Edward Gordon. *California Institute of Technology, Jet Propulsion Laboratory, Memorandum No.* 20-120, Mar. 1956, 47 p.

Method for calculating, from the composition of a steel, the temperature required to temper it to a desired hardness after quenching to martensite, is based on statistical analysis of hardness measurements on about 5000 samples from laboratory heats. (J29, ST)

207-J. Heat Treatment of Copper and Aluminum Wire. II. H. J. Miller. *Industrial Heating,* v. 23, July 1956, p

1422, 1424.

Annealing procedures. (J23, Cu, Al)

208-J. Huge Car-Type Furnace of Adjustable Length For Heat Treating at Temperatures Up to 2200° F. *Industrial Heating*, v. 23, July 1956, p. 1388, 1390, 1392, 1532.

Details on construction, burners and temperature control. (J1, J23)

209-J. Interchange Induction Coils to Meet Job Needs. D. H. Otto. *Iron Age*, v. 178, July 26, 1956, p. 66-68.

Interchangeable high-frequency work coils boost heating efficiency and set high standards in quality and uniformity. (J2, ST)

210-J. Continuous Furnace Cuts Small Part Hardening Costs. Herbert Chase. *Iron Age*, v. 178, July 26, 1956, p. 70-71.

Less costly, more uniform case hardening resulted from installation of a continuous batch-type carbonitriding furnace; operator loads part trays, furnace does the rest. (J28, ST)

211-J. Heat Treating Thousands of Aluminum Parts Per Day. C. A. Boz and W. E. Coon. *Modern Metals*, v. 12, July 1956, p. 40, 42.

Aluminum fin-blades for guided missiles are solution heat treated and artificially aged at rates of thousands per day. (J27, Al)

212-J. (Czech.) **Rapid Heating of Steels.** Bedrich Bukovsky. *Hutnik*, v. 6, no. 3, Mar. 1956, p. 66-70.

Theoretical results of rapid heating. Heating temperature is dictated by carbon content, amount of impurities and inclusions and degree of nonhomogeneity. Effect of rapid heating on thermal conductivity, specific heat, thermal expansion, modulus of elasticity, toughness and other mechanical properties. (J2, Q general, P11, P12, ST)

213-J. (Dutch.) **Exothermic Gas Generators.** C. H. Luiten. *Smit Mededelingen*, v. 11, no. 2, June 1956, p. 61-67.

Principles of operation with particular attention to ways of safeguarding against back-firing and interruption of combustion. Chemical composition of the prepared atmosphere. (J2)

214-J. (Russian.) **New Method of Heat Treating Forgings.** D. I. Kostenko. *Avtomobil'naia i Traktornaia Promyshlennost'*, 1956, no. 5, May 1956, p. 38-40.

The use of cemented steels and other high-quality steels with high-temperature threshold of grain growth, lowered resistance of austenite and other beneficial physical-mechanical properties makes it possible to use isothermal cooling in mechanized containers, after gear forming, thus eliminating normalizing and high-tempering steps. (J26, AY)

215-J. (Russian.) **A Method of Testing the Flowability of Molten Media During Heat Treatment of Steel in Molten Salts and Alkalies.** A. I. Zot'ev and Iu. A. Zot'ev. *Zadvodskaia Laboratoriia*, v. 22, no. 6, June 1956, p. 695-697.

A device for direct measurement of viscosity in a working salt bath. Effect of flowability of the medium on cyanide and case hardening of metals. (J28, S18, ST)

216-J. "Quick Quench" Steel Balls for Ore Grinding. G. Mounsey. *Canadian Metals*, v. 19, July 1956, p. 36-37.

Electric-arc furnace at the mine site provides a continuous supply of long-wearing steel grinding balls. (J26, B13, ST)

217-J. Metallurgical Aspects in the Design and Operation of a New Continuous Annealing Line. A. F. Mohri. *Iron and Steel Engineer*, v. 33, July 1956, p. 148-154.

Time and temperature relationships, effective annealing factors and their influence on hardness of steel. (J23, ST)

218-J. Effect of Conditions of Cooling After Heating Upon Mechanical Properties of Low Alloy Steels. I. A. Nenaezdnikov. *Henry Brutcher, Translation No.* 3758, 4 p. (From *Vestnik Machinostroeniya*, v. 24, no. 8, 1954, p. 52.)

Hardnesses, tensile properties and impact values for two different steels with five different heat treatments. (J general, Q29, Q23, Q6, AY)

219-J. Bit Design, Selection, and Evaluation. II. What Heat Treatment Does for Rock Bits. H. G. Bentson. *Oil and Gas Journal*, v. 54, Aug. 6, 1956, p. 112.

Presents carburizing and quenching procedures. (J28, ST)

220-J. (Russian.) **Change of Carbide Dispersion During Annealing of Quenched Steel.** K. F. Starodubov and S. G. Cherniavskaia. *Dopovidi Akademii Nauk Ukrains' koi RSR*, 1956, no. 3, p. 259-262.

Absence of carbide growth in the temperature range from 300 to 400° C. and an intensive growth at 425 to 525° C. were observed by means of photocolorimetry. (J23, M26, ST)

K

Joining

377-K. Carbon Dioxide Slashed Our Welding Costs. R. J. Keller and J. P. Koss. *American Machinist*, v. 100, July 16, 1956, p. 118-120.

Production testing gives comparative costs on identical jobs shielded with argon, helium and carbon dioxide. (K1)

378-K. How to Avoid Cracks in Welding Stabilized Stainless. W. L. Fleischmann. *Iron Age*, v. 178, July 12, 1956, p. 76-78.

An explanation of zone cracking and tips for preventing cracks. Photographs. (K1, Q26, SS)

379-K. Joining Stampings: Which Method Is Best for You? Federico Strasser. *Iron Age*, v. 178, July 12, 1956, p. 80-83.

Factors influencing choice of joining method, tips on riveting, brazing, welding and other techniques. (K general)

380-K. Automatic Setup Welds Structural Steel Fast. C. W. Sherman. *Iron Age*, v. 178, July 19, 1956, p. 116-117.

Fabricating building columns from structural steel took 45 hr. by hand, versus 8 hr. on automatic equipment. Technique found practical on wide-flange sections up to 60 ft. long at speeds of 20 in. per min. (K1, T26, ST)

381-K. No-Heat Adhesives Simplify Joining Problems. *Iron Age*, v. 178, July 19, 1956, p. 118-119.

Latest epoxy-based formulations cure without heat, offer high-strength, simple-to-make, trouble-free joints. Application to power switching equipment was very successful. (K12)

382-K. Selection of Stainless Steel Electrodes for Trouble-Free Welds. R. David Thomas, Jr., *Metal Progress*, v. 70, July 1956, p. 73-76.

Welding cracks in Type-347 can be eliminated by using an electrode which will produce a weld containing a small amount of ferrite. (K1, SS)

383-K. The Welding of Zirconium. E. C. Rollason and B. S. Hockenhull. *Welding and Metal Fabrication*, v. 24, July 1956, p. 230-234.

Argon-arc welding and its influence on mechanical and corrosion properties. (K1, Q general, R general, Zr)

384-K. Aluminium Fabrication in Boat Building. R. C. Du Cane. *Welding and Metal Fabrication*, v. 24, July 1956, p. 235-240.

Design and construction of a 68 ft. all-welded aluminum boat, using self-adjusting arc welding equipment. (K1, T22, Al)

385-K. Fortiweld, a New Development in Weldable High-Tensile Steel. III. H. F. Tremlett. *Welding and Metal Fabrication*, v. 24, July 1956, p. 250-252.

Satisfactory mechanical tests on butt welds in 1-in. thick Fortiweld plate, welded by the Unionmelt process, indicate that welding wire to Grade 3 and powder to Grade 80 are desirable. (K1, Q general, ST)

386-K. Root Passes in Stainless Steel With New Inert-Arc Procedures. E. B. Lavelle, L. H. Rasmussen and E. M. Kuchera. *Welding Journal*, v. 35, July 1956, p. 647-654.

The joint closure method described makes it possible to obtain satisfactory uniformity of inner weld surface with comparative ease. (K1, SS)

387-K. Power Supplies for Gas-Shielded Metal-Arc Welding. A. Lesnewich and E. Cushman. *Welding Journal*, v. 35, July 1956, p. 655-664.

The constant-voltage transformer-rectifier with automatic regulation for fluctuations in line voltage is the best general-purpose power source. (K1)

388-K. Physical Properties of Commercial Silver-Copper-Phosphorus Brazing Alloys. Karl M. Weigert. *Welding Journal*, v. 35, July 1956, p. 672-674.

Alloys are self-fluxing and used especially in places where fluxes cannot be removed after the brazing operation, but are only recommended for joining nonferrous metals, since iron phosphide formation embrittles the joints. (K8, SG-f)

389-K. Pressure Welding by Heating With High-Speed Electrodes. Mellon O. Washburn. *Welding Journal*, v. 35, July 1956, p. 675-678.

Laboratory tests indicate that new process is capable of butt welding tubular sections of various diameters and wall thicknesses with a number of advantages over other processes. (K6)

390-K. A Systems Analysis Approach to Aircraft Spot-Weld Reliability. J. M. Peterson and E. R. Funk. *Welding Journal*, v. 35, July 1956, p. 679-683.

New approach to the problem of spot-weld reliability seems to hold the best promise for advancing the usage of spot welding in the aircraft and other quality-conscious industries. (K3)

391-K. Chocolate Molds Repaired With Nickel-Steel Solder. Herbert Drapkin. *Welding Journal*, v. 35, July 1956, p. 684-685.

New solder means longer produc-

tion life and reduced cavity breakage. (K7, SG-f)

392-K. Effect of Moisture in the Coatings of Low-Hydrogen Iron-Powder Electrodes. D. C. Smith, W. G. Rinehart and K. P. Johannes. *Welding Journal,* v. 35, July 1956, p. 313S-322S.

Porosity and cracking in weld metal and fusion zone is the principal detrimental effect of moisture. (K1, Fe)

393-K. Evaluation of Weld-Cracking Tests on Armor Steel. S. Wiss, J. N. Ramsey and H. Udin. *Welding Journal,* v. 35, July 1956, p. 348S-356S.

Different heats of alloy armor plate were studied by means of cruciform, controlled thermal severity, and multiple bead-on-plate weld-cracking susceptibility tests. (K9, AY)

394-K. (Czech.) **Mechanization and Automation in Electric Resistance Butt Welding.** A. Matousek. *Strojirenska vyroba,* v. 4, no. 4, Apr. 1956, p. 164-166.

Description of Czech automatic resistance welding machines. (K3)

395-K. (Czech.) **Some Interesting Applications of Resistance Flash-Welding.** Jiri Böhm. *Zvaranie,* v. 5, no. 5, May 1956, p. 130-136.

Methods, equipment and adaptation for production line fabrication. Butt welding methods applied to pipes, axles, crank and drive shafts. Flash welding of aluminum automobile fenders. (K3, Al)

396-K. (Czech.) **Testing Solders.** Viliam Ruza. *Zvaranie,* v. 5, no. 5, May 1956, p. 136-141.

Testing apparatus and procedures for evaluating and comparing the properties of various types of hard and soft solders. Performance and evaluation tests for determining ability of solder to fuse with the metals being joined, flowing properties, strength and working temperature. (K7)

397-K. (Czech.) **Mechanical Properties of Bonded Joints of Light Metals.** Vladimir Gregor. *Zvaranie,* v. 5, no. 5, May 1956, p. 141-143.

Comparison of the bonding qualities of two bonding materials, "Upon 1001 B," and "Upon 1200 P." Both adhesives resist corrosion. (K12, Q23)

398-K. (German.) **Welding Methods and Welding Machines.** H. V. Hofe. *Schweissen und Schneiden,* v. 8, no. 6, June 1956, p. 182-186.

Problems of welding research and methods and machines in use in Germany and foreign countries. (K1, K2, K3)

399-K. (German.) **Problems of Welding Design and Their Calculation.** K. H. Effertz. *Schweissen und Schneiden,* v. 8, no. 6, June 1956, p. 187-189.

Evaluation of welds in steel structures, types of steel, calculation of welds in bridge construction. (K1, K2, T25, ST)

400-K. (German.) **Material Problems of Welding.** Helmut Koch. *Schweissen und Schneiden,* v. 8, no. 6, June 1956, p.. 193-203.

Effect of welding method on the weldability of metals. Physical and metallurgical processes in fusion welding, problems of fusion-welding, zonal character of fusion-welded joints. (K general)

401-K. (German.) **Investigations and Studies of Metal Joining.** K. Krause. *VDI Zeitschrift,* v. 98, no. 18, June 1956, p. 983-984.

A study of the factors affecting the strength of a joint. Includes corrosion resistance, properties of various adhesives, flexural vibration strength and relation between the tensile stress on the metal at the breaking point of the joint to the tensile strength of the metal. (K general, Q23)

402-K. (German and French.) **Component Metals in High-Frequency Soldering.** *Zeitschrift für Schweisstechnik,* v. 46, no. 6, June 1956, p. 133-139.

Physical properties, specifications and applications of component metals for high-frequency soldering. Optimum soldering temperatures. (K7)

403-K. (Hungarian.) **Results Achieved with Hungarian-Made Bonding Materials for Metals.** Maria Hollo Gyenesné. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 235-238.

Investigation of Hungarian-developed "Polikon H1": an alkali-type polyester contact resin, its aging, chemical resistance and application. (K12)

404-K. (Russian.) **Arc Welding of Magnesium Alloys.** S. Z. Klintsov, A. A. Laptev and P. M. Liubalin. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 17-20.

Investigates practical problems of proper electrode coatings, mechanical and corrosion tests and metallographic examination of welds and industrial testing of the procedures. (K1, Mg)

405-K. (Russian.) **Torsion Testing of Spot Welds.** B. D. Orlov and P. L. Chuloshnikov. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 20-21.

Equipment and procedures involved and the results of spot weld tests on a number of materials. (K9, K3)

406-K. (Russian.) **Automatic Welding of Nonturnable Pipe Joints.** V. R. Verchenko, A. V. Petrov and M. I. Baranov. *Svarochnoe Proizvodstvo,* no. 6, June 1956, p. 22-26.

Compares relative advantages of butt welding of pipes with consumable and nonconsumable electrodes. Describes equipment used in welding of nonturnable pipe butts. (K1)

407-K. (Russian.) **Automatic Argon-Shielded Arc Welding With a Consumable Electrode of Stainless Steel in Various Spatial Positions.** A. I. Akulov, and N. Iu. Pal'chuk. *Svarochnoe Proizvodstvo,* 1956, no. 6, June 1956, p. 27-29.

Recently developed method of arc welding stainless steel by using currents at which molten filler metal flows in a "jet" rather than by drops. Method leads to good results regardless of position of the electrode. (K1, SS)

408-K. Practical Application of Inert-Gas Shielded Metallic Arc Welding. J. A. Lutze and J. P. Best. *Australasian Engineer,* v. 48, May 1956, p. 56-62.

Emphasis is on copper and copper alloys, particularly phosphor bronze. Aluminum, stainless steel and mild steel also considered. (K1, Cu, Al, SS, ST)

409-K. Heavy Machine-Frame Construction. Colin Spencer. *British Welding Journal,* v. 3, July 1956, p. 297-301.

The factors affecting the preparation and welding of heavy machine frames are considered in relation to the duty of the machine, and the fabrication of a number of examples is desired. (K1, ST)

410-K. Welding Composite Steels: Applied Liners. Helmut Thielsch. *Machine Design,* v. 28, July 26, 1956, p. 86-91.

Summarizes methods of welding liners to backing steel and joining the composite plates. (K1, K3, ST)

411-K. Tapes Automatically Control Big Riveter. John H. Stansbury and J. M. Brakestraw. *Metalworking Production,* v. 100, July 6, 1956, p. 1029-1031.

"Drivmatic" riveter uses punched tape but is fundamentally mechanical. It accurately positions 9 x 47-ft. wing panels so that finished riveted fastenings can be made at the rate of two a minute. (K13)

412-K. (Czech.) **Mechanization of Welding in Boilermaking Plants.** Vladimir Kvizda. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 98-104.

Design features and operation of new mobile equipment, automatic and semiautomatic, for welding longitudinal and other seams of boilers. (K1, ST)

413-K. (Dutch.) **The Sigma-Welding of Steel.** W. Gerritsen. *Smit Mededelingen,* v. 11, no. 2, June 1956, p. 39-53.

The Sigma welding of low carbon steel. Apparatus involved, mechanical properties of the weld, applications and economical possibilities. (K1, CN)

414-K. (French.) **A Contribution to the Study of the Welding of Refractory Austenitic Steels.** Joseph Hochmann. *Metaux, Corrosion-Industries,* v. 31, no. 370, June 1956, p. 265-273.

Lowering the silicon content of the electrode improves the weld, but a slight modification in the gamma and alpha-producing elements, which changes austenoferritic structure, seems to be the best solution to the problem. (K1, ST)

415-K. (German.) **Improvements in Securing Screws. I. Spring Washers and Their Increase of Efficiency.** W. Koennecke. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 22, Ausgabe B, no. 3, 1956, p. 85-94.

The turning moments for tightening and loosening, the axial loads, the springiness and the security effect of screws were measured by means of new high-precision measuring devices. The data obtained were used to design an improved washer. (K13)

416-K. (German.) **About the Evaluation of the Stresses Occurring Due to Plastic Tightening of Screws on an Inclined Base.** H. Hasselgruber. *Forschung auf dem Gebiete des Ingenieurwesens,* v. 22, Ausgabe B, no. 3, 1956, p. 95-101.

The theory of ideally plastic bodies was applied to the determination of stress distributions in the cross section of the screws. (K13, Q25)

417-K. (Slovak.) **Mechanical Properties of Bonded Joints of Light Metals.** Vladimir Gregor. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 112-113.

Foreign and Czechoslovak progress in bonding light metals. Mechanical properties of two adhesives. Effect of temperature on notch toughness of these resins when solidified. Static and dynamic loading tests of bonded aluminum alloys. (K12, Q general, Al, Mg)

418-K. Brazing and Soldering of Titanium. W. J. Lewis, G. E. Faulkner and P. J. Rieppel. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No.* 45, June 1956, 19 p.

Summary of information in published literature and in Government research reports. Brazing and soldering procedures; properties of joints brazed with commercial and experimental filler metals. (K7, K8, Ti)

419-K. It Isn't Mud—If You Are Careful. H. F. Ried Jr. *Canadian Metals*, v. 19, July 1956, p. 18, 20, 22.

Welding electrode manufacture calls for careful process control to meet high modern welding standards. (To be continued.) (K1)

420-K. Carbon Dioxide For Welding. II. Allen F. Knight. *Canadian Metals*, v. 19, July 1956, p. 24-27.

New methods of control and application have brought carbon dioxide back to stay as an "inert" gas for welding. (K1)

421-K. Ductile Iron: What It Is, What It Does, Where It's Used, and How to Weld It. H. C. Waugh. *Industry & Welding*, v. 29, Aug. 1956, p. 48-52, 78-81.

Several times stronger than gray cast iron, 4 to 12 times tougher and so ductile it can be bent and twisted without breaking, this metal is welded in much the same way as cast iron. (K1, Q23, CI)

422-K. Semi-Automatic Inert Arc Puts Aluminum in the Swim. Charles Berka. *Industry & Welding*, v. 29, Aug. 1956, p. 54-56, 81.

Some details of use of consumable electrode inert-arc welding of strong, light-weight thick plate aluminum to fabricate pools which are competitively priced with those of other good construction, yet can be installed in less time and with much less effort. (K1, Al)

423-K. Assembly Line Welding Speeds Fabrication of Tunnel Tubes. *Industry & Welding*, v. 29, Aug. 1956, p. 58 + 5 pages.

Equipment and welding procedures. (K1)

424-K. How to Weld Special Corrosion-Resistant Stainless Steels. G. J. Gibson. *Industry & Welding*, v. 29, Aug. 1956, p. 66 + 5 pages.

Characteristics of supercorrosion resistant stainless steels; recommended welding procedures. (K1, SS)

425-K. Positioneering. III. Charles N. Aronson. *Industry & Welding*, v. 29, Aug. 1956, p. 74-76, 78.

The lever principle and how it affects weldment positioning. (To be continued.) (K1)

426-K. How We Weld Light Gage Stainless Steel Tubing. Raymond Gardner. *Industry & Welding*, v. 29, Aug. 1956, p. 110-111.

Use of a special welding torch in conjunction with the inert-gas tungsten-arc process has made it possible. (K1, SS)

427-K. Bronze Filler Rod for Sheet Metals. C. A. Medsker. *Industry & Welding*, v. 29, Aug. 1956, p. 85-86, 88-89.

Strong braze welded joints are dense, nonporous and have no lumpy spots. Surface is clean and bright and easily dressed for final finishing. (K2, Cu)

428-K. Induction Heating Streamlines Production-Brazing Practices. C. W. Holt. *Machinery*, v. 62, Aug. 1956, p. 150-155.

Areas to be brazed should not be heated too rapidly; joint strength is dependent on proper clearances; type and application of flux affect joint quality; considerations in the design of applicable fixtures. (K8)

429-K. How to Use Fluxes and Solders for Good Joints. W. P. McQuillan. *Metalworking Production*, v. 100, July 13, 1956, p. 1072-1075.

Types of fluxes, their characteristics and uses. (K7)

430-K. Fixtures for Brazing. I. A. M. Setapen. *Welding Engineer*, v. 41, Aug. 1956, p. 21-23.

Considerations to be made in designing jigs of metal or ceramics. (To be continued.) (K8)

431-K. Careful Welding Allows Wide Use of 430 Stainless. J. A. Goodford and E. A. Loria. *Welding Engineer*, v. 41, Aug. 1956, p. 35-36.

Situations to be avoided in gas or electric welding of 430 stainless. (K1, K2, SS)

432-K. Insert Rings Help Prevent Root-Pass Weld Cracks. Helmut Thielsch. *Welding Engineer*, v. 41, Aug. 1956, p. 42, 44.

Details to be followed in tungsten inert-gas welding. (K1)

433-K. Project Undertakes Electode Analysis for Mild Steel Welding. Julian D. Carey and Robert D. Mann. *Welding Engineer*, v. 41, Aug. 1956, p. 72, 74.

Determination of optimum compositions and conditions for mild steel welding by the inert-gas process. (K1, K9, ST)

434-K. (French.) Laying, Welding, and Testing Welds in Large Pipe Lines. H. Gerbeaux. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 71-87.

Chemical and mechanical properties of the pipe, preparation, electrode used, welding apparatus, training the welders, the actual welding procedure, special problems such as crossing roads and water, testing procedures. (K general)

435-K. (French.) Soldering With Silver Solders. Actual Technique and New Developments. Hans Rudolph and Ewald Wagner. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 88-96.

Silver solders may be more economical to use than bronze welding. Advantages include lower working temperatures, greater fluidity, strong joints, corrosion resistance and good thermal and electric conductivity. May be used with induction heating. Special solders. (K8, Ag)

436-K. (French.) Some Considerations Relative to the Welding of Alloyed Steels Used in the Construction of Modern Heating Machines. A. Lüthy. *Soudage et Techniques Connexes*, v. 10, no. 5-6, May-June 1956, p. 117-129; disc., p. 129-131.

The welding of ferritic and austenitic steels for gas generators, gas turbines, steam turbines and jet engines. (K general, T25, AY)

437-K. (French.) The Welded Construction of Large Oil Tankers. J. Grenet. *Soudage et Techniques Connexes*, v. 10, no. 5-6, May-June 1956, p. 133-143; disc., p. 144-147.

The increase in size of tankers requires new techniques in shipbuilding. New problems and technique in welding the hulls require new materials, thicker steel plate. New assembly techniques; some "prefabrication" suggestions; weld testing. (K general, T22)

438-K. (French.) Hard Surfacing and Welding in Clad Metal Construction. H. Gerbeaux. *Soudage et Techniques Connexes*, v. 10, no. 5-6, May-June 1956, p. 148-154.

Methods of hard surfacing and joining of clad steels, types of electrodes for welding clad metals, use of small inserts, homogeneous and heterogeneous hard surfacing. (K1, L24, ST)

439-K. (German.) Deep-Penetration Electrodes. Weldability and Economy in Welding With the Aid of Transformers and Rectifiers. Herbert Neumann. *Oerlikon Schweissmitteilungen*, v. 13, no. 23, 1955, p. 5-23.

An investigation into various aspects of the use of transformers and rectifiers in deep-penetration welding. General requirements, welding transformers, welding rectifiers, intensity of welding current, diameter of electrodes, proper and faulty procedures, comparative economy of the method and outlook for further development. (K1)

440-K. (German.) New Insights and Development in the Field of Metallurgy of Welding of Ferrous Materials. K. L. Zeyen. *Oerlikon Schweissmitteilungen*, v. 13, no. 23, 1955, p. 25-69.

An installment, covering the period from spring 1954 to summer 1955, of a comprehensive survey and evaluation of about 340 publications from all over the world on the latest problems and developments in the general field of the metallurgy of welding ferrous materials. An extensive bibliography is included. (K general, Fe)

441-K. (Russian.) Welding by Means of Electro-Rivets in CO_2 Atmosphere. N. M. Novozhilov and A. M. Sokolova. *Svarochnoe Proizvodstvo*, no. 7, July 1956, p. 10-13.

New method of using electrode wires with a higher content of deoxidizing agents in a carbon dioxide atmosphere. (K1)

L

Cleaning, Coating and Finishing

537-L. It's Cheaper by Tumbling. Leon E. Laux. *American Machinist*, v. 100, July 16, 1956, p. 124-128.

Cost per part tumbled fell from 10c to less than ¾c, as experience was gained and more diversified equipment installed. Use of precisely graded, fused aluminum-oxide chips and tumbling compounds is a major key to success. (L10)

538-L. Porcelain Enamel Applied Electrostatically. W. L. Smart. *Automation*, v. 3, Aug. 1956, p. 46-47.

Home appliance parts are sprayed with cover coat as they travel in helical paths around disks. (L27)

539-L. Red Lead in the Protection of Iron and Steel. I. H. Masseille. *Corrosion Prevention and Control*, v. 3, June 1956, p. 35-37.

Causes of metal oxidation, protection of metal surfaces, characteristics and properties of paints. (To be continued) (L26, ST)

540-L. Metallic Lead Pigment for Marine Anti-Corrosion Paints. I. J. R. Surridge, *Corrosion Prevention and Control*, v. 3, June 1956, p. 39-40.

Nature of the pigment and mechanism of protection; qualities of metallic lead paints as compared with practical requirements. (To be continued.) (L26, Pb)

541-L. Recent Research on Anticorrosive Bottom Compositions. H. J. Adams and J. C. Hudson. *Corrosion Prevention and Control*, v. 3, June 1956, p. 41-45.

Formulations of anticorrosive compositions; preparation of ship for painting; metallic coatings. (L26)

542-L. Metallising Non-Conductors.

F. Elser. *Industrial Finishing (London)*, v. 9, June 1956, p. 618-621. (Translated from *Metalloberfläche*, v. 8, no. 7, 1954, p. 107-110.)

Applications of the process and solutions used. (L23)

543-L. Productivity in the Electroplating Industry. G. A. Edwards and E. A. Ollard. *Industrial Finishing (London)*, v. 9, June 1956, p. 631-633, 635.

A survey of representative plating shops giving detailed and general recommendations for improving output and reducing costs. (L17)

544-L. What You Should Know About Anodized Coatings for Aluminum. R. V. Vanden Berg. *Materials & Methods*, v. 44, July 1956, p. 90-94.

Types of treatments, properties, coloring and sealing and forming characteristics. (L19, Al)

545-L. Electroplated Coatings. J. B. Mohler. *Materials & Methods*, v. 44, July 1956, p. 117-132.

Data on characteristics and uses to help the designer of a metal product select an electroplated coating for decorative or functional purposes. (L17, T10)

546-L. Ball Burnishing Fundamentals. Arthur S. Kohler. *Metal Finishing*, v. 54, July 1956, p. 44-47.

Mechanical factors affecting the final finish, burnishing barrels, burnishing shot, barrel load and chemical factors affecting the final finish. (L10)

547-L. Surface Treatment and Finishing of Light Metals. IX. Coloring Anodic Coatings. S. Wernick and R. Pinner. *Metal Finishing*, v. 54, July 1956, p. 48-53.

Organic dyeing processes, inorganic dyes, multicolored effects and photographic and interference color processes. (L19, L14, EG-a)

548-L. Better Barrel Finishing With Improved Abrasives. William E. Brandt. *Metal Progress*, v. 70, July 1950, p. 88-90.

The new fused chips and bonded shapes of aluminum oxide and the chemical additives available make tumbling a precise method of cleaning and finishing the metal. (L10)

549-L. Blast Cleaning Variables. (Digest of "The Blast Cleaning of Metal Surfaces", by Otto Peltzer, *Stahl und Eisen*, v. 75, Dec. 1955, p. 1681-1691.) *Metal Progress*, v. 70, July 1956, p. 142, 144.

Previously abstracted from original. See item 213-L, 1956. (L10)

550-L. Leaf-Free Aluminum Pigments. I. New Grades Gain in Popularity. W. F. Torreyson Jr., and Kenneth E. Luyk. *Paint, Oil & Chemical Review*, v. 119, July 12, 1956, p. 8-10.

Applications and advantages of new metallic automotive finishes. (L26, H11, Al)

551-L. The Development of a Standard Blister Test for Automobile Paint Finishes. A. J. Birch. *Product Finishing*, v. 9, May, 1956, p. 65-75.

Correlation of existing test procedures; development of apparatus for mechanically agitated water soak test; specifications for preparation of test panels. (L26, S22)

552-L. Elementary Topics for Research in Metal Finishing. II. The Electroplating Process. C. James. *Product Finishing*, v. 9, May 1956, p. 76-89.

Purity of chemicals, anode problems, wash waters. (To be continued.) (L17)

553-L. Finishing Fluorescent Fixtures in Modernized Plant. *Products Finishing*, v. 20, July 1956, p. 16-22.

New plant uses the latest techniques in cleaning, phosphatizing, painting, baking and materials handling, integrated into a continuous "semiautomatic" procedure. (L26, L14, L10)

554-L. Surface Finishes for Stainless Steels. Kenneth M. Huston. *Products Finishing*, v. 20, July 1956, p. 24 + 10 pages.

Factors to be considered in finishing stainless steel. (L10, L12, SS)

555-L. Water Reducible Coatings for Industrial Finishing. Gerould Allyn. *Products Finishing*, v. 20, July 1956, p. 40-45.

Practical water-reducible primers for automotive and appliance use can be made with Rhoplex AC-33 acrylic emulsion. These finishes are substantially nonflammable in liquid form. (L26)

556-L. Producing Molds by Electroplating Methods. W. J. B. Stokes II. *Products Finishing*, v. 20, July 1956, p. 48-50.

The mold skin is electroformed in hard nickel and then backed with copper by electroplating until the dies are built up completely. (L18, Cu, Ni)

557-L. Recent Progress in Airless Spray Painting. James A. Bede. *Products Finishing*, v. 20, July 1956, p. 62-64.

Principles of airless spray, influence of nozzle selection and temperature on performance, applications. (L26)

558-L. More Jobs for Plating. *Steel*, v. 139, July 16, 1956, p. 136-138.

New processes such as level plating and brush plating lead to more industrial uses. (L17)

559-L. New Surfacing Techniques. K. H. Koopman and R. S. Zuchowski. *Welding Journal*, v. 35, July 1956, p. 665-671.

Mechanized oxy-acetylene hard surfacing, inert-arc processes, submerged-arc hard surfacing and composite-tube-rod surfacing. (L24)

560-L. (Czech.) **Diffusion Sulfurizing.** J. Nainar. *Strojirenska vyroba*, v. 4, no. 3, Mar. 1956, p. 123-124.

Types and methods of diffusion sulfurizing. Laboratory and industrial use tests. Effect of temperature on friction and wear properties of diffusion-sulfurized bearing surfaces. Need for further research. (L15, Q9)

561-L. (Czech.) **Use of Ultrasound in Cleaning Metal Surfaces.** J. Rones. *Strojirenska vyroba*, v. 4, no. 4, Apr. 1956, p. 162-163.

Ultrasound considerably accelerates degreasing of metal surfaces, particularly in organic solvents. Ultrasonic cleaning equipment. (L 10)

562-L. (French.) **Testing the Adherence Quality and Mechanical Brittleness of Vitrified Enamel Coatings Applied on Cast Iron and Sheet Steel.** Pierre Tyvaert. *Fonderie*, 1956, no. 124, May 1956, p. 185-197.

Use of pendulum-type and vertical drop-hammer and free-fall ball-bearing apparatus. (L27, ST, CI)

563-L. (French.) **Hot Galvanizing of Bolts and Small Pieces.** *Metallurgie*, v. 88, no. 5, May 1956, p. 501-505.

Inspection of finished pieces. Conclusions to series of articles on the subject. (L16, Zn)

564-L. (French.) **Surface Treatment of Aluminum and Its Alloys. III. Electrolytic Treatments—Anodic Oxidation.** Charles Etienne and Francois Flusin. *Revue de l'Aluminium*, v. 33, no. 232, May 1956, p. 507-513.

Anodic oxidation compared to electrolysis of water. (L19, Al)

565-L. (German.) **Electroplating of Palladium.** Edmund R. Thews. *Metalloberfläche*, v. 10, no. 7, July 1956, p. 193-196.

Plating methods, properties of coating, recovery of palladium. (L17, Pd)

566-L. (Norwegian.) **Macroscopic and Microscopic Plating Surface in the Electroplating Bath.** Einar Snekvik. *Teknisk Ukeblad*, v. 103, no. 25, June 21, 1956, p. 566-573.

Thickness and quality of plating and review of new plating methods. (L17)

567-L. Chemical Kinetics in Porcelain Enamel Reactions. Richard Moore Spriggs. *American Ceramic Society Bulletin*, v. 35, July 1956, p. 280-285.

In a study of the reactions of powdered iron and powdered cobalt with a frit containing copper ions, the amount of copper ion reduced to the metal was determined, using quantitative X-ray diffraction techniques, and the specific reaction rate k was calculated. Results showed that the specific reaction rate decreased rapidly as the time of reaction increased and as the per cent of powdered metal increased. An increase in temperature resulted in an increase in the reaction rate. (L27, P13, H11, Fe, Co)

568-L. Aluminum Enameling. III. What Enamelers Should Know About Aluminum. Paul A. Huppert. *Ceramic Industry*, v. 67, Aug. 1956, p. 73-75.

Properties, types of finishes and applications of enameled aluminum and its alloys. (L27, Al)

569-L. The Commercial Advantages of Calcium Plumbate Paint. *Corrosion Technology*, v. 3, July 1956, p. 233-235.

This powerful rust inhibitor has many other advantages such as good brushability and storage properties and great resistance to salt spray. (L26)

570-L. The Painting of Castings. E. Johnson. *Electroplating and Metal Finishing*, v. 9, July 1956, p. 225-228.

Priming and filling, comparative merits of wrinkle and hammer finishes and methods of producing them. (L26)

571-L. Oxide Formation and Overvoltage of Oxygen on Lead and Silver Anodes in Alkaline Solution. P. Jones, H. R. Thirsk and W. F. K. Wynne-Jones. *Faraday Society, Transactions*, v. 52, July 1956, p. 1003-1011.

Studies made in a solution of potassium hydroxide. (L19, P15, Pb, Ag)

572-L. Pilot Setup for Experimental Flow Coating. P. C. Bardin. *Industrial Finishing*, v. 32, July 1956, p. 48 + 5 pages.

The pilot installation, equipped with the latest automatic control devices, operates under actual shop conditions. (L26)

573-L. Continuous Galvanizing. *Instruments and Automation*, v. 29, July 1956, p. 1321.

Operation of a new continuous hot-dip galvanizing line. (L16, Zn)

574-L. Finishing Aluminum. R. C. Spooner and J. Loucks. *Modern Metals*, v. 12, July 1956, p. 62 + 4 pages.

Special emphasis is on extrusions. Mechanical finishes, anodizing procedures, color tests and a new German bright dip process. (L19, L10, L16, Al)

575-L. Americium Electrodeposition. Roy Ko. *Nucleonics*, v. 14, July 1956, p. 74.

The precipitation of metal hydroxides at the cathode by the electrolytic formation of base is applicable to the deposition of any element having a slightly soluble hy-

droxide, and provides a means for preparing thin, adherent films of the more electropositive elements that cannot be deposited as metals from aqueous solutions. In particular, this method is convenient for preparing thin films of the rare earth and actinide elements. (L17, Am)

576-L. A Minimum Destruction Test for the Adhesion of Hard Chromium Deposits. Hyman Chessin and John G. Poor. *Plating*, v. 43, July 1956, p. 913-915.

Observations of the small indentations made to a predetermined depth in hard chromium can determine whether the adhesion is or is not adequate. The method is applicable to production items where a small indentation may be tolerated. (L17, Cr)

577-L. Plating of Zinc Die Castings. K. W. Howard. *Plating*, v. 43, July 1956, p. 916-917.

A manually operated plant, for copper, nickel and chromium plating on zinc-base die castings. (L17, Zn, Cu, Ni, Cr)

578-L. Colored Anodic Coatings on Aluminum. Helmer Bengston. *Plating*, v. 43, July 1956, p. 918-921.

Factors which govern the formation of colored electrolytic oxide coatings on aluminum and its alloys. Properties of the oxide coating, and effect of alloying elements, coloring materials, and the finishing procedure. (L19, Al)

579-L. The CR-22 Anodic Coating for Magnesium. W. McNeill. *Product Finishing*, v. 9, June 1956, p. 48-51.

Anodically formed coating combines short treatment times and low electrolyte costs. Data are given on bath composition and control, preparatory treatment, a typical treatment cycle and performance. (L19, Mg)

580-L. Finishing Processes for Machine Tools. J. H. Ousbey. *Product Finishing*, v. 9, June 1956, p. 52-57, 98.

Factors determining choice of paints for machine tools, details of a complete cellulose finishing process. Applications for other types of finishes. (L26, ST)

581-L. Elementary Topics for Research in Metal Finishing. III. Electrodeposited Coatings. C. James. **Product Finishing,** v. 9, June 1956, p. 65-72.

Various problems concerning deposit distribution, alloy plating, deposit thickness and treatment after plating. (To be continued.) (L17)

582-L. Polyamide Resin-Epoxy Ester Combinations for Surface Coatings. *Product Finishing*, v. 9, June 1956, p. 76-78, 106.

Preparation of vehicle, application, qualities of the film produced. (L26)

583-L. Vinyl Laminate. C. F. Kiernan and A. J. Lombardi. *Product Engineering*, v. 27, July 1956, p. 167-170.

New adhesive and automatic bonding process "Marvibond" applies a 4 to 20-mil film of polyvinyl chloride to sheet metal; coating is tough and bonding tight enough to take forming and deep drawing without damage or separation from base metal. (L26)

584-L. Acid Etching and Electroforming Precision Parts. Marvin C. Cook. *Product Engineering*, v. 27, July 1956, p. 194-199.

Methods, applications, production techniques and design considerations. (L18)

585-L. Electrostatic Paint. The Ransburg Processes. Richard Tilney. *Sheet Metal Industries*, v. 33, no. 351, July 1956, p. 444-446, 454.

Principles of operation of the "Ransburg No. 2" process and recent developments related to its applicability. (L26)

586-L. Chromium Diffusion and Its Application to Sheet-Metal Parts. R. L. Samuel and N. A. Lockington. *Sheet Metal Industries*, v. 33, no. 351, July 1956, p. 447-454.

Defines position of diffusion processes within the vast range of surface treatments now available, and general physical properties of chromium-diffused parts. (L15, Cr, CN)

587-L. Hurry-Up Solution Control. *Steel*, v. 139, July 30, 1956, p. 94-95.

Conversion charts translate electrophotometer and automatic titrator readings directly into bath-addition quantities for standard enameling pickle-room solutions. (L12)

588-L. Processing With Supersonic Energy. Carl E. Meinheit. *Sylvania Technologist*, v. 9, July 1956, p. 89-94.

The use of ultrasonic energy in industrial applications offers advantages in cleaning, machining and fluxless soldering operations. Cavitation, the underlying force in sonic processing and some applications are described. (L10, G17, K7)

589-L. The Structure and Growth of Electrodeposits. H. Wilman. Paper from "The Journal of the Imperial College Chemical Engineering Society". p. 96-112.

Weight and thickness of electrodeposits as a function of current and time; microscopic observations; x-ray and electron diffraction studies. (L17, M27, M26)

590-L. (German.) **The Electrolytic Deposition of Rhodium.** J. Fischer and F. Leonhard. *Metall*, v. 10, no. 13-14, July 1956, p. 608-617.

Some problems of electroplating silver with rhodium, including conditions influencing the current yield, effect of inorganic and organic impurities in the bath on appearance of the deposit, protective properties of rhodium coatings and problems presented by the fissured structure of the thicker deposits. (L17, Rh, Ag)

591-L. (German.) **Cladding of Materials With Precious Metals.** *Metall*, v. 10, no. 13-14, July 1956, p. 633-635.

Manufacture, properties and uses of bimetal electrical contact materials. (L22, T1, EG-c, SG-r)

592-L. (Czech.) **Zinc Coating of Wire and the Drawing of Zinc-Coated Wire.** Bedrich Hosna. *Hutnik*, v. 6, no. 3, Mar. 1956, p. 76-80.

Description and comparison of methods of zinc coating, including galvannealing, the "Crapo" method and galvanizing. Microstructure, drawability, and strength properties of wires zinc-coated by different methods. (L16, F28, Q23, M27, ST, Zn)

593-L. (Russian.) **Some Questions Concerning the Electrodeposition of Alloys. II. Investigation of the Shift in the Ionic Discharge Potentials During Alloy Formation. III. Conditions for Nearing of Metal Deposition Potentials at the Expense of Alloying Energy.** Iu. M. Polukarov and K. M. Gorbunova. *Journal of Physical Chemistry*, v. 30, 1956, p. 871-881.

594-L. (Russian.) **Features of Anodic Behavior of Steel in an Electropolishing Electrolyte for Low Density Polarizing Currents.** G. S. Vozdvizhensky, A. Sh. Valeyev and G. A. Gorbachuk. *Doklady Akademii Nauk SSSR*, v. 108, no. 2, May 11, 1956, p. 299-301 + 1 plate.

Experiments toward explanation of the mechanism of electrolytic polishing, corrosion, passivation and general protection of metal. Steel samples showed a change in structure of the subsurface metal with no changes in the surface metal. Current density variations influenced composition. (L13, ST)

595-L. (French.) **Applications of Vacuum Techniques in the Deposition and Fusion of Materials.** R. P. Henry. *Métaux, Corrosion-Industries*, v. 31, no. 370, June 1956, p. 274-288.

General sketch of gas kinetics. Vacuum pumps. Methods of depositing thin layers of a material in a vacuum by thermal evaporation and cathodic atomization. Practical application of the latter method for depositing materials on semiconductors to make crystal rectifiers. (L25)

596-L. How Windshield Reveal Moldings Are Made, Buffed, and Plated. Herbert Chase. *Automotive Industries*, v. 115, July 15, 1956, p. 54-57, 180.

Illustrated step-by-step description. (L17, L10)

597-L. Electrocladding of Zirconium With Platinum. Arch B. Tripler, Jr., John G. Beach and Charles L. Faust. *Battelle Memorial Institute, (U. S. Atomic Energy Commission)*, BMI-1097, June 1956, 11 p.

A method, which includes use of periodic reverse plating, was developed for electrocladding zirconium with sound, pore-free platinum coatings up to 1.5 mils in thickness. (L17, Zr, Pt)

598-L. Study of Bonding Fundamentals. Horace R. Ogden, James E. Reynolds, James B. Melehan and Robert I. Jaffee. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1101, June 1956, 29 p.

Techniques and equipment developed for bonding and measuring bond strengths of single-asperity bonds. Preliminary results indicate that the growth of bonded areas may follow a rate equation. (L22)

599-L. Control of Contamination and Corrosion in Rail Tank Cars. S. John Oechsle, Jr. and Kenneth G. Le Fevre. *Flow*, v. 11, Aug. 1956, p. 94 + 7 pages.

Types of protective linings and coatings, preparation of tank car for lining application, application process. (L26)

600-L. Same Setup Tumble-Deburrs Large and Small Parts. J. E. Romais. *Iron Age*, v. 178, Aug. 2, 1956, p. 86-87.

Castings up to 30 in. long deburr in the same equipment handling 2-in. aluminum-clad parts. (L10, Al)

601-L. Continuous Hot Dipped Galvanizing. Nelson E. Cook and M. D. Ayers. *Iron and Steel Engineer*, v. 32, Apr. 1956, p. 53-57.

Regulates the degree of tightness of the zinc coating by controlling the amount of aluminum which unites with any iron that would normally tend to form alloy layers with the zinc on the surface of the steel being coated. (L16, Zn, ST)

602-L. The Alloying of Tin and Iron During Flow-Brightening of Electro-Tinplate. C. J. Thwaites. *Iron and Steel Institute, Journal*, v. 183, July 1956, p. 244-253.

Examination of the effect of varying time-temperature relationships on the rate of formation and on the metallography of the alloy layer. (L17, M27, Fe, Sn)

603-L. How a Non-Ferrous Job-Shop Cleans Castings. *Modern Castings*, v. 30, Aug. 1956, p. 54.

Cleaning is done by airless abrasive blasting in a 2-cu. ft. load unit. (L10, Cu, Al)

604-L. Leaf-Free Aluminum Pigments. II. Polychrome and Hammer Finish. W. F. Torreyson Jr., and Kenneth E. Luyk. *Paint, Oil & Chemical Review*, v. 119, July 26, 1956, p. 8-10.

Proper selection and combination of resins, solvents and color pigments is essential. (L26, Al)

605-L. A Study of Methods for Preparing Clad 24S-T3 Aluminum-Alloy Sheet Surfaces for Adhesive Bonding. I. Studies of Various Methods of Cleaning Clad 24S-T3 Aluminum-Alloy Sheets as Normally Received. II. Studies of Some of the More Promising Cleaning Methods in Treatment of Contaminated Surfaces of Clad 24S-T3 Aluminum-Alloy Sheets. H. W. Eickner and W. E. Schowalter. **III. Effect of Cleaning Method on Resistance of Bonded Joints to Salt-Water Spray.** H. W. Eickner. *U. S. Department of Agriculture, Forest Products Laboratory, Reports No.* 1813 and 1813-A, May 1950, Dec. 1950, 20 p. and 7 p.

606-L. (French.) **Anticorrosive Plastic Coverings.** L. Rémy. *Corrosion et Anticorrosion*, v. 4, no. 5, June 1956, p. 217-221.

Shortcomings of bituminous coatings on buried metals. True protection against corrosion obtained by using several layers of material, each with a particular function. The layer in direct contact with the metal protects against chemical and electrical action. (L26)

607-L. (German.) **Plastic Coating of Metals.** G. Schulz. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 22, no. 6, June 1956, p. 178-182.

Application of plastics as powder, paste, foil or plate. (L26)

608-L. (German.) **Flame Sprayed Nonmetallic Coating.** Hans Reininger. *Werkstoffe und Korrosion*, v. 7, no. 7, July 1956, p. 373-385.

Equipment and material for protective spray coating of metals. Properties. (L26)

M

Metallography, Constitution and Primary Structures

297-M. Vibratory Polishing of Metallographic Specimens. F. M. Krill. *Metal Progress*, v. 70, July 1956, p. 81-82.

A new method of polishing aluminum alloys with vibrating equipment has reduced the labor and skill required and increased the quality. (M21, Al)

298-M. An Emission Electron Microscope for Research at High Temperatures. G. Baas and G. W. Rathenau. *Philips Technical Review*, v. 18, June 1956, p. 1-10.

Construction and use of microscope having a resolving power of about 1000° A. and an adjustable magnification of up to 3000 X. (M21)

299-M. (French.) **Influence of the Microstructure of Steel on the Cold Working Coefficient *n* Determined During Tensile Testing in the Interval $E_{0.01}$ and $E_{0.2}$. Possible Relation of This Coefficient With Adaptation Phenomena.** Georges Delbart and Fernand Maratray. *Comptes Rendus*, v. 242, no. 23, June 4, 1956, p. 2718-2720.

Shows that the above coefficient varies with the microstructure. (M27, Q27, ST)

300-M. (German.) **Solid Solutions in the System ZnS-MnS, ZnSe-MnSe, and ZnTe-MnTe.** Robert Juza, Albrecht Rabenau and Gertrud Pascher. *Zeitschrift für anorganische und Allgemeine Chemie*, v. 285, no. 1-2, May 1956, p. 61-69.

Experimental investigation included determinations of solubility, conductivity, crystal structure, molecular volume and coordination number. (M24)

301-M. (German.) **Investigation of the Theory of Energy State of Electrons in Ideal and Disordered Crystal Lattices.** Folker Engelmann. *Zeitschrift für Physik*, v. 145, no. 4, 1956, p. 430.450.

Three-dimensional treatment of the above problem based on a simplified potential process. Dependence of Electron energy on the degree of lattice disorder. (M26)

302-M. (German.) **Liquidus Curve and Critical Point of the Aluminum-Zinc System.** A. Munster and K. Sagel. *Zeitschrift für Physik Alische Chemie (Frankfurt)*, v. 7, no. 5-6, 1956, p. 296-316.

Construction of the phase diagram by measurements of electrical conductivity. (M24, P15, Al, Zn)

303-M. A Practical System for Preparing Metallographic Specimens. Roy L. Anderson. *AB Metal Digest*, v. 2, July 1956, p. 3-5.

A tried and proven method. (M21)

304-M. Direct Observation of Defects in Crystal Lattices. *Engineer*, v. 202, July 6, 1956, p. 6.

Electron microscope shows dislocations in platinum phthalocyanine crystals. (M26)

305-M. Metallographic Identification and Crystal Symmetry of Titanium Hydride. L. D. Jaffe. *Journal of Metals*, v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, July 1956, p. 861.

Titanium hydride showed strong optical anisotropy when examined under polarized light. Its structure is probably tetragonal. (M26, Ti)

306-M. Autoradiography in the Study of Surface Phenomena. B. Verkerk. *Nucleonics*, v. 14, July 1956, p. 60-64.

Technique used for making surface autoradiographs of metal specimens. (M23)

307-M. Atomic Mobility in a Cu-Al Alloy After Quenching and Neutron Irradiation. Chi Yao Li and A. S. Nowick. *Physical Review*, v. 103, ser. 2, July 15, 1956, p. 294-303.

A study of atomic mobility in a Cu-Al (17 at. % Al) solid solution was carried out by anelastic relaxation methods. (M25, Q22, J26, Cu, Al)

308-M. Effect of Core Excitation on the Hyperfine Structure of Rubidium. Melba Phillips. *Physical Review*, v. 103, ser. 2, July 15, 1956, p. 322-323.

Perturbations of the ratio of hyperfine coupling constants for the 5*P* levels of rubidium were investigated. (M25, Rb)

309-M. Gamma Transitions in Ta^{181}. F. Boehm and P. Marmier. *Physical Review*, v. 103, ser. 2, July 15, 1956, p. 342-343.

The nuclear spectrum of Ta^{181}. (M25, Ta)

310-M. The Direct Study by Electron Microscopy of Crystal Lattices and Their Imperfections. J. W. Menter. *Royal Society, Proceedings*, v. 236, ser. A, July 10, 1956, p. 119-135 + 7 plates.

Studies on thin crystals of copper and platium phthalocyanine in the transmission electron microscope. (M26, Cu, Pt)

311-M. The Metallographic View. Metallography of Carburized Cases. XXIV. Refinement Afforded by Double Treatment. H. E. Boyer. *Steel Processing*, v. 42, July 1956, p. 396, 414.

Photomicrographs show degree of refinement which can be effected by quenching, reheating and requenching process. (M27, J28, J26, ST)

312-M. Evaluating Titanium Alloys by X-Ray Diffraction. *Western Metals*, v. 14, July 1956, p. 67-68.

Studies have led to suppression of undesirable metal phases and enhancement of beneficial structures. (M22, M26, Ti)

313-M. (English.) **On the Properties of Binary Mixtures. II. A Method for Testing the Assumption of Compound Formation.** Erik Högfeldt. *Receuil des Travaux Chimiques des Pays-Bas*, v. 75, no. 6, June 1956, p. 790-795.

Positive and negative deviations from ideal behavior in binary mixtures in relation to the formation of compounds with a stoichiometric composition A_nB_v. Results are applied to metallic phases. (M24, Bi, Tl, Hg, Pb, Cd)

314-M. (French.) **Cinemicrography in Metallurgy.** A. Kerleroux and R. Foin. *Métaux, Corrosion-Industries*, v. 31, no. 370, June 1956, p. 289-294.

Methods and equipment used. An experiment in following the structural changes of a stainless steel sample between 20 and 900° C. using color film. Method furnishes valuable information about the speed at which phenomena proceed. (M23, N8, SS)

315-M. (French.) **Effect of Temperature and Pouring Speed on Ingot Structure.** *Revue de Métallurgie*, v. 53, no. 6, June 1956, p. 471-481.

Examination of ingot surfaces revealed transverse cracks in the ingot cast rapidly at a higher temperature, while that cast more slowly at a lower temperature exhibited a slaggy surface. (M28, D9, ST)

316-M. (German.) **The Copper-Silver-Cadmium System. I.** Erich Gebhardt and Günter Petzow. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 401-411.

Structure investigated by thermal analysis, microhardness determination, X-ray examination, and dilatometrical measurements. (M24, Cu, Ag, Cd)

317-M. (German.) **Structure and Phases in the Copper-Tellurium System.** Ingeborg Patzak. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 418-420.

The phases Cu_2Te_x, Cu_7Te_5, and CuTe examined by X-ray. (M24, Cu, Te)

318-M. (German.) **The Three-Element System Copper-Lead-Tellurium.** Horst Gravemann and Hans-Joachim Wallbaum. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 433-441.

Phase equilibria investigated by thermal analysis and microscopic examination. (M24, Cu, Pb, Te)

319-M. (Polish.) **Criterion of Existence of an Intermetallic Compound in Binary Systems.** Aleksander Krupkowski. *Archiwum Hutnictwa*, v. 1, no. 1, 1956, p. 3-9.

Thermodynamic considerations. (M24)

320-M. (Russian.) **On the Structure of the "White Zone".** L. S. Palatnik, I. M. Liubarskii and B. T. Boiko. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 285-293 + 1 plate.

The metallographic method, microhardness tests, radiographic examination and chemical analysis used to study structure of the so-called white zone in the surface layers of the teeth of case-hardened cog wheels. (M27, J28, ST)

321-M. (Russian.) **On Reliefs Formed by Twin-Crystal Interlayers on Cleavage Planes of Bismuth, Antimony and Zinc.** V. I. Startsev and V. M. Kosevich. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 320-327.

An interferometric and radiographic study of microreliefs of cleavage planes of metallic crystals deformed by twinning. Deflection angles of the cleavage plane both in the twin and in the abutting regions are calculated and measured. (M27, M26, Bi, Sb, Zn)

322-M. (Russian.) **A Study of Alloys of the Gold-Cobalt System.** A. T. Grogor'ev, E. M. Sokolovskaia and M. V. Maksimova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1047-1051.

Thermal analysis of the system, determination of microstructure, hardness and electric resistance. Gold with cobalt has a simple diagram with a eutectic at 10% cobalt, eutectic temperature of 995° C., and a limited solubility of components in the solid state. (M24, Co, Au)

323-M. (Russian.) **A Study of the Palladium-Gold-Cobalt System.** A. T. Grigor'ev, E. M. Sokolovskaia, L. D. Budennaia, I. A. Iiutina and M. V. Maksimova. *Zhurnal Neoganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1052-1063.

Investigation by thermal analysis, determination of hardness and microstructure after annealing and hardening at various temperatures, specific resistance and its temperature coefficient. Palladium increases the mutual solubility of gold and cobalt to a considerable extent. (M24, Co, Au, Pd)

324-M. (Russian.) **A Study of the Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleimonov, L. M. Viting and V. V. Kuprina. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1064-1066 + 1 plate.

An improved phase diagram plotted on the basis of thermal analysis and data on microstructure and hardness. The system shows no discontinuity in solubility in the liquid state. (M24, Cu, Co)

325-M. (Russian.) **A Study of the Palladium-Copper-Cobalt System.** A. T. Grigor'ev, L. A. Panteleimonov, V. V. Kuprina and L. I. Rybakova. *Zhurnal Neorganicheskoi Khimii,* v. 1, no. 5, 1956, p. 1067-1073 + 1 plate.

Thermal analysis, determination of microstructure after annealing, Brinell hardness, and specific resistance and its temperature coefficient. Mutual solubility of copper and cobalt increases with increasing palladium content. (M24, Pd, Cu, Co)

326-M. The Metallographic Structure of Cast 11-14% Chromium Steels. Arne Faerden. *Metallurgia,* v. 54, no. 321, July 1956, p. 3-10.

The steels were first studied in the as-cast and in the tempered conditions, and then the austenitic structure was developed by thermal etching in high vacuum. (M27, SS)

327-M. The Effects of Radiation on Solids. Frederick Seitz and Eugene P. Wigner. *Scientific American,* v. 195, Aug. 1956, p. 76 + 5 pages.

The orderly atomic arrangement characteristic of metals and other crystals determines many of their properties. Energetic radiation disturbs the order and thus can drastically alter the properties. (M26)

328-M. Dislocations in Face-Centered Cubic Lattices. N. Thompson. Paper from "Defects in Crystalline Solids". Physical Society, p. 153-158.

Considers limitations imposed by the geometry of the crystal lattice on the nature and configuration of dislocations in a face-centered cubic lattice, with particular reference to the form and properties of 'jogs' in dislocation lines. (M26)

329-M. An Experimental Study of Dislocations in Aluminium—Copper Alloys by Means of Precipitation. H. Wilsdorf and D. Kuhlmann-Wilsdorf. Paper from "Defects in Crystalline Solids". Physical Society, p. 175-186.

Results of an electron microscope investigation into preferred precipitation in slip lines and dislocations in aluminium with betwen 1.2 and 4.8% copper. (M26, N7, Al)

330-M. The Influence of Dislocations and Impurities on the Distribution and Size of Etch-Figures on Pure Aluminium. G. Wyon and P. Lacombe. Paper from "Defects in Crystalline Solids". Physical Society, p. 187-196.

It is probable that associations of dislocations and impurity atoms are necessary for the formation of etch-figures, but it must be assumed that etching is due to the presence of impurity atoms in more or less condensed atmospheres. (M26, Al)

331-M. Stored Energy and Lattice Defects in Cold-Worked Metals. W. Boas. Paper from "Defects in Crystalline Solids". Physical Society, p. 212-221.

Measurements of changes in internal energy, electrical resistivity, density and hardness which occur during annealing of copper and nickel deformed at room temperature indicate that almost all the energy stored in copper is due to dislocations, but vacancies make a significant contribution to that stored in nickel. (M26, P12, Cu, Ni)

332-M. Stacking Faults in Close-Packed Lattices. A. Seeger. Paper from "Defects in Crystalline Solids". Physical Society, p. 328-339.

From considerations of the electronic structures it is concluded that monovalent metals and cobalt should have low stacking fault energies whereas Al, Mg, Zn, Cd, Ni, Pd, Pt should have high stacking fault energies. (M26)

333-M. Small Angle Scattering of X-Rays by Cold-Worked Metal. J. Blin. Paper from "Defects in Crystalline Solids". Physical Society, p. 420-422.

Intensity of scattered rays is used to study the defects created in metals by plastic deformation. (M22, M26, Q24)

334-M. (English.) **On the Electron Diffraction Patterns From the Oriented Silver Films.** Yasuyoshi Watanabe. *Physical Society of Japan, Journal,* v. 11, no. 7, July 1956, p. 740-747.

Intensity distribution was calculated and compared with calculated intensities by assuming that the silver film was composed of the parallel-growth structures, the twin structures and the structures having defects. (M26, L25, Ag)

335-M. (English.) **Anomalous Enhancement of X-Ray Reflection Intensity at the Boundary of Ground and Etched Regions on Crystal Surface.** Norio Kato. *Physical Society of Japan, Journal,* v. 11, no. 7, July 1956, p. 748-754.

The anomalous enhancement is due to a reduction of primary extinction caused by elastic distortion accumulated at the boundary region. (M22, M26)

336-M. (French.) **Gases and Inclusions in Steel. II. Oxygen in Steel.** P. Tyou. *Industrie Chimique Belge,* v. 21, no. 6, June-July 1956, p. 579-592.

Analytical procedures and apparatus. (M27, D9, S11, ST)

337-M. (Book.) **Theory of Alloy Phases.** 378 p. 1956. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Twelve papers on such subjects as the band theory of bonding in metals, X-ray spectroscopy of solids, crystal structure and atomic size, structure of solid solutions, and alloy phase diagrams. (M general)

N

Transformations and Resulting Structures

339-N. Metal Atom Migration Recorded on Film. R. E. Hoffman. *Industrial Photography,* v. 5, July 1956, p. 24-25, 49.

X-ray film exposed to radioactive silver shows movement of atoms along grain boundaries in study into structure of metals. (N1, S19)

340-N. Structural Changes During the Fatigue of Some Aluminium Alloys. T. Broom, J. H. Molineux and V. N. Whittaker. *Institute of Metals, Journal,* v. 84, June 1956, p. 357-363, + 2 plates.

Alloys of good static and fatigue strength must possess a metallurgical structure in which a stable dispersion is combined with a matrix containing sufficient solute atoms of a suitable kind to confer strain-aging properties. (N7, Q7, Al)

341-N. The Structure and Growth of Oxide Layers Formed on Beryllium. I. S. Kerr and H. Wilman. *Institute of Metals, Journal,* v. 84, June 1956, p. 379-385 + 1 plate.

Data on the oxidation of abraded, vacuum-condensed and electropolished beryllium surfaces, heated in air. (N15, L13, L19, Be)

342-N. Applications of the Phenomenological Theories of Martensite. I. Geometrical Treatment. II. Related Types of Martensitic Transformation. J. W. Christian. *Institute of Metals, Journal,* v. 84, June 1956, p. 386-398.

Almost all known martensitic transformations may be reduced to either or both of two types in which the twinning plane, or plane of the lattice invariant strain, is respectively a (110) or a (111) plane of a suitable orthorhombic cell of the product lattice. (N8, N9)

343-N. X-Ray Study of the Local Atomic Arrangement in Partially Ordered Cu_3Au. D. R. Chipman. *Journal of Applied Physics,* v. 27, July 1956, p. 739-746.

The atomic arrangement present in a single crystal in a state of equilibrium partial long-range order was investigated by measuring with X-ray techniques the short-range order existing below critical temperature. (N10, Au, Cu)

344-N. Formation of *p-n* Junctions in Semiconductors by the Variation of Crystal Growth Parameters. Henry E. Bridgers. *Journal of Applied Physics*, v. 27, July 1956, p. 746-751.

The Burton fluid transport theory for the variation of the effective distribution coefficient with growth rate and stirring applied to the growth of semiconductor crystals from a melt containing both donor and acceptor impurities. (N12)

345-N. (French.) Possibilities of Studying Structural Transformations by Cinemicrography at Variable Temperatures. P. Azou and A. Kerleroux. *Métaux Corrosion-Industries*, v. 31, no. 369, May 1956, p. 244-249.

Study of the precipitation of carbides in unstabilized 18-8 stainless steel during heating from room temperature to 800° C., and also in a 25-20 stainless steel. (N7, M23, SS)

346-N. (German.) Investigations of Recrystallization of Low-Alloy Aluminium Materials During Hot and Cold Working. W. Rosenkranz. *Aluminium*, v. 32, no. 7, July 1956, p. 390-397.

The behavior of the manganese-containing alloy $AlMg_3$ during extrusion and subsequent cold working has been studied to provide information about alloy composition and processing conditions. (N5, Al)

347-N. (German.) Investigation of Kinetics of Martensite Formation. Heinrich Beisswenger and Erich Scheil. *Archiv für das Eisenhuttenwesen*, v. 27, no. 6, June 1956, p. 413-420.

Device for measuring fast transformation processes. Electrical resistance measurement in irreversible iron-nickel alloys. Increase of reversibility time by means of deformation. (N8, N9, Fe, Ni)

348-N. (German.) Carbon in Nonferrous Metals. III. Carbon Content in Copper and in Copper Alloys. J. Fischer and W. Schmidt. *Zeitschrift für Erzbergabau und Metallhüttenwesen*, v. 9, no. 6, June 1956, p. 284-288.

Literature data on solubility of carbon in copper is reviewed. Original measurements described and findings tabulated. (N12, C, Cu)

349-N. (Italian.) The Measurement of Elastic Modulus and Internal Friction as Methods for Studying the Kinetics of Recrystallization of Aluminum. T. Federighi and F. Gatto. *Alluminio*, v. 25, no. 6, June 1956, p. 279-285.

A study of the kinetics of the isothermic recrystallization process of aluminum by the elastic modulus, measured dynamically and the internal friction. (N5, Q21, Q22, Al)

350-N. (Spanish.) Study of the Isothermal Transformation of Austenite in Nine Hypereutectoid Chromium-Nickel Steels. Benjamin Estruch Subirana. *Instituto del Hierro y Acero*, v. 9, no. 45, Apr. 1956, p. 432-462.

Experimental study of the decomposition of austenite at subcritical temperatures in regions in the TTT diagram. From the results a critical study is made of the various theories that exist to explain the kinetics of the reaction. (N8, AY)

351-N. (Spanish.) Decomposition of Austenite During Gradual Tempering. Benjamin Estruch Subirana. *Instituto del Hierro y del Acero*, v. 9, no. 46, May 1956, p. 595-617.

Effect of time of holding test pieces at a determined subcritical temperature on the course of decomposition of the austenite at a lower temperature, both temperatures being in the same temperature zone of the corresponding TTT diagram. (N8, ST)

352-N. (Swedish.) Diffusion in the Cu-Zn System. Ulf Landergren. *Jernkontorets Annaler*, v. 140, no. 6, 1956, p. 401-424.

Recent data on self-diffusion and chemical diffusion in copper, zinc, alpha and beta brass, and beta-prime brass, as well as grain boundary diffusion of zinc in copper. Probable mechanisms are suggested. (N1, Cu, Zn)

353-N. Electrolytic Deposition and Diffusion of Lithium Into Magnesium. J. Smolinski. *Journal of Applied Chemistry*, v. 6, Apr. 1956, p. 180-186.

Lithium diffused into the cathode to form a β-phase magnesium-lithium alloy to a depth of 1.5 mm. (N1, L17, Li, Mg)

354-N. Determination of Diffusivities in Liquid Metals by Means of Temperature-Gradient Zone Melting. J. H. Wernick, *Journal of Chemical Physics*, v. 25, July 1956, p. 47-49.

Liquid alloys of Ge-Al, Ge-Au, and Si-Al were studied by this new technique. (N1, Ge, Al, Au, Si)

355-N. Influence of Adsorbed Films on Crystal Growth Kinetics. Gerald W. Sears. *Journal of Chemical Physics*, v. 25, July 1956, p. 154-159.

Growth steps are inoperative or poisoned below a critical supersaturation. (N12)

356-N. Some Crystallographic Characteristics of Ordered $MgCd_3$ in Relationship to Its Anomalous Thermal Equilibration at Low Temperatures. W. E. Wallace, R. S. Craig and T. D. Brotherton. *University of Pittsburgh, (U. S. Atomic Energy Commission)*, NYO-6329, Jan. 1956, 13 p.

Measurements indicate that the axial ratio is frozen below 281° K. but varies with temperature at higher temperatures. (N10, Mg, Cd)

357-N. (French.) Heat Resistant Low Alloy Steels and Their Heat Treatment. G. Delbart and A. Constant. *Métaux, Corrosion-Industries*, v. 31, no. 370, June 1956, p. 251-264.

Heat treatment as it affects strength and the formation of precipitates. Role of carbide precipitates formed during the treatment, effects of the fineness of precipitates, secondary hardening. (N7, Q23, J general, SS-h)

358-N. (German.) Recrystallization Texture of Highly Deformed Brass Wire. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 379-382.

The amount of (100) increases with the deformation. The level of deformation at which (100) exceeds (111) goes up with the zinc content. (N5, Q24, Cu)

359-N. (German.) Intermediary Structure Improvement of Copper During Recrystallization. Heinz Borchers and Alfred Schafer. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 382-389.

The process of growing is interrupted by quick intermediate refining of the structure, followed by a prolonged period of crystal growth. (N5, Cu)

360-N. (German.) The Tendency of Partially Recrystallized α-Brass to Grain Growth. Richard Ergang. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 389-396.

During a certain intermediate stage when it has partly recrystallized, Ms63 brass tends to discontinuous grain growth. If the sheet is deformed by 10 or 20%, substantial formation of coarse grains may occur locally after annealing at 580° C. for 40 min. Ms72 does not show this tendency. (N3, N5, Q24, Cu)

361-N. (German.) Recrystallization Graphs of Ms63. Ernst Fischer and Hugo Vosskühler. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 397-401.

Attention is drawn to the relations between hardness and the physical properties found by tensile tests on Ms63 brass. (N5, Q27, Q29, Cu)

362-N. (German.) Certain X-Ray Observations During Hardening of a Copper-Beryllium Alloy. Guido Bassi. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 417.

During the process of precipitation the cubic face-centered lattice of the α-phase temporarily becomes tetragonal face-centered. (N7, Cu, Be)

363-N. (German.) Effect of Stresses and the Phenomenon of Transformation Plasticity in the $\beta 1$-β'' Transformation of Brass. Erhard Hornbogen and Günter Wassermann. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 427-433.

The influence on the martensite conversion process exercised by uniaxial tensile and compressive stress was followed for an alloy containing 60.8% copper. (N9, Q25, Cu)

364-N. (Russian.) The Effect of Overheating of Liquid Steel on Its Crystallization. D. S. Kamenetskaia, I. B. Piletskaia and E. P. Rakhmanova. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 254-258 + 1 plate.

The effect of overheating of liquid steel on its cast grain size in the absence of active foreign particles and soluble admixtures as well as in the presence of soluble and insoluble admixtures. Results seem to prove a common applicability of a general crystallization law to both organic and inorganic substances and low and high melting metals and alloys. (N12, ST)

365-N. (Russian.) Recrystallization Parameters in Induction Heating. Ts. N. Rafalovich. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 259-269.

Determination of grain germination and grain growth rate in cold worked low-carbon steel, in rapid induction heating and in relatively slow heating. (N5, J2, CN-g)

366-N. (Russian.) Obtaining Single Crystals of Desired Orientation From Molten Aluminum. D. E. Ovsienko and E. I. Sosnina. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 270-276.

A study of the orienting effect of mica on the growth of aluminum crystals and of the influence of the crystal growth rate on orientation. Method and apparatus for growing single crystals in vacuum. (N12, Al)

367-N. (Russian.) Stabilization of Austenite at Temperatures Beyond the Martensite Transformation Range. K. A. Malyshev, N. A. Borodina and V. A. Mirmel'shtein. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 277-284.

Isothermal treatment of austenite at temperatures above that of the beginning of the martensite transformation may result both in an increase and a decrease in the stability of austenite depending on which of the two processes, stabilization or destabilization, is predominating. (N8)

368-N. (Russian.) Use of Isotope Tracers in the Study of the Phenomenon of Internal Adsorption at the Boundary Between the Al-Ag Alloy and the

Oxidation Film. V. I. Arkharov, A. F. Gerasimov, and P. L. Gruzin. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 294-302.

An experimental study of the concentration of silver in the subsurface layers of alloys covered with an oxidation film, and of the part played by the internal adsorption in this phenomenon. (N1, M23, R2, Al, Ag)

369-N. (Russian.) **On the Determination of the Activation Energy of Diffusion Processes.** M. A. Krishtal. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 303-308.

Deals with the possibility of determining the limiting link of complex diffusion processes from the magnitude of their activation energy computed with the aid of the exponential equation expressing the temperature dependence of the velocity of reaction diffusion processes. A suitable method of calculation is offered. (N1, P13)

370-N. (Russian.) **A Study of the Diffusion of Boron and Carbon Into Certain Metals of the Transition Group.** G. V. Samsonov and V. P. Latysheva. *Fizika Metallov i Metallovedenie*, v. 2, no. 2, 1956, p. 309-319 + 1 plate.

Radiographic and chemical analyses, as well as microhardness measurements, show that the diffusion is of the reaction type. Activation energy is found to increase with the atomic number of the metallic component. (N1, B, C)

371-N. (Russian.) **Solidification of Ingots and Castings.** N. T. Gudtsov and B. B. Guliaev. *Vestnik Akademii Nauk SSSR*, v. 26, no. 5, May 1956, p. 22-28.

Historical development of the theory of crystallization in ingots. Special attention given to the gradual crystallization theory. (N12)

372-N. (Russian.) **Use of Autoradiography in the Study of Intercrystalline Liquation in Steel.** I. E. Bolotov, M. I. Gold'shtein, A. A. Popov and A. B. Fedorov. *Zavodskaia Laboratoriia*, v. 22, no. 6, June 1956, p. 682-688.

A study of the liquation of sulfur, phosphorus and tungsten in steel by autoradiography with the aid of radioactive isotopes of these elements. Influence of the cooling rate during crystallization. (N12, M23, ST)

373-N. (Russian.) **On Methods of Studying Autodiffusion in Tungsten.** V. P. Vasil'ev and S. G. Chernomorchenko. *Zavodskaia Laboratoriia*, v. 22, no. 6, June 1956, p. 688-691.

Measurement technique. The activation energy is the highest known in metals with the exception of bismuth. (N1, P13, W)

374-N. Crystal Growth and Lattice Defects. W. Dekeyser. Paper from "Defects in Crystalline Solids". Physical Society, p. 134-142.

Brief review of work on growth following the Frank mechanisms and polytypism growth producing spiral pits, dissolution and etching and growth of silver chloride on sodium chloride and its relation with epitaxy. (N12, M26)

375-N. Kinetics of Precipitation in Aluminium Silver Alloys. G. Borelius. Paper from "Defects in Crystalline Solids". Physical Society, p. 169-174.

Microscopic and X-ray analysis, calorimetric and resistometric measurements. (N7, Al, Ag)

376-N. Structure and Anisotropy of Diffusion in Grain Boundaries. R. Smoluchowski. "Defects in Crystalline Solids". Physical Society, p. 197-202.

Highest anisotropy occurs at the lowest angles at which any grain boundary diffusion is observed and it decreases to zero at the highest angle of disorientation. Penetration at a cusp orientation depends upon the density of atoms of misfit. (N1)

377-N. Gases in Iron and Steel. Norman A. Parlee. *Foundry*, v. 84, Aug. 1956, p. 80-87.

Review of behavior of various gases in metals, dealing largely with mechanisms by which gases get into and come out of metals. (N15, N16, Fe, ST)

378-N. Formation and Tempering of Martensite in 18-8 Steels. Paul G. Bastien and Jacques M. B. Dedieu. *Iron and Steel Institute, Journal*, v. 183, July 1956, p. 254-259.

Martensite obtained by simple cooling and by plastic straining, processes involved in tempering 18-8 steels transformed by cold work, effect of heat treatment on the hardness of transformed steels. (N8, J29, SS)

379-N. Bainitic Retained Austenite. J. A. Cameron. *Iron and Steel Institute, Journal*, v. 183, July 1956, p. 260-267.

A dilatometric study of the effects of temperature and time on the decomposition of bainitic retained austenite in En 40C steel. Effect of conditioning on mechanical properties. Occurrence in other B.S. En steels. (N8, Q general, AY)

380-N. Some Experiments on the Composition of Carbides in Low-Alloy Steels. J. E. Bowers. *Iron and Steel Institute, Journal*, v. 183, July 1956, p. 268-274.

Variations in carbide composition in a series of six low-alloy steels investigated as a function of temperature of isothermal transformation, using X-ray and chemical methods. (N8, AY)

381-N. The Interdiffusion of Uranium and Aluminium. A. D. LeClaire and I. J. Bear. *Journal of Nuclear Energy*, v. 2, June 1956, p. 229-242.

Measurements of the width, as a function of temperature and pressure, of the diffusion zone formed by the interdiffusion of uranium and aluminum and of the relative penetration of uranium into aluminum and of aluminum into uranium. (N1, U, Al)

382-N. Cast Structure of High-Speed Steel. E. Ineson and G. Hoyle. *Metal Treatment and Drop Forging*, v. 23, July 1956, p. 257-262.

Causes and effects of the formation of coarse cellular carbides in high speed steels, elimination of the problem considered. (N2, TS)

383-N. Marker Movement in Scale Layers. K. Sachs. *Metallurgia*, v. 54, no. 321, July 1956, p. 11-17.

Nickel and copper markers, in the form of electrodeposits and wires of various thicknesses, were placed on the surface of mild steel specimens which were subsequently oxidized at 900° C. During oxidation thick wires moved outward, very thin markers moved inward and intermediate sizes occupied intermediate positions. (N1, R2, ST)

384-N. Concentration Changes in Retained Austenite. N. F. Lashko. *Henry Brutcher, Translation No.* 3718, 10 p. (From *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 5, 1954, p. 884-888.) Henry Brutcher, Altadena, Calif.

Evidence shows that the austenite-to-martensite transformation is not "diffusionless" and the austenite is not retained, but is formed through interaction with the surroundings. X-ray data included. (N8, J22, ST)

385-N. (Polish.) **Using Radioactive Isotopes to Study the Diffusion of Metal.** Zygmunt Jasiewicz. *Hutnik*, v. 23, no. 4, Apr. 1956, p. 163-167.

Various procedures for study of diffusion — the absorption method, based on penetration of the isotope into the depths of the sample; the thin layer method, based on the change in intensity of radiation after diffusion heating of a thin plate; the thick layer method, based on the asymptotic character of the intensity of radiation-period of the diffusion curve. (N1)

386-N. (Russian.) **The Significance of the Resistance of the Medium in the Graphitization of Cast Iron.** A. F. Landa. *Liteinoe Proizvodstvo*, no. 6, June 1956, p. 21-23.

Data indicate that the graphitization process is controlled not only by diffusion of the carbon, but also by the solution of the carbides, the graphite growth and the resistance of the metal base to plastic deformation. (N8, N1, Q24, CI)

P

Physical Properties and Test Methods

365-P. The Thermodynamics of the Liquid Solutions in the Triad Cu-Ag-Au. II. The Cu-Au System. Russell K. Edwards and Merwyn B. Brodsky. *American Chemical Society, Journal*, v. 78, July 5, 1956, p. 2983-2989.

Thermodynamic values obtained from rate of effusion measurements, carried out over a number of solutions in the temperature range from 1500 to 1600° K. (P12, M24, Cu, Au)

366-P. (English.) **Studies on the Wetting Effect and the Surface Tension of Solids. The Change in Scratch Hardness of Carbon Steel and Aluminium Due to Wetting by Some Cutting Liquids.** Mizuho Sato and Kanji Miyazawa. *Japan Academy, Proceedings*, v. 32, No. 4, Apr. 1956, p. 267-269.

Experiments with "Cimcool" and "Dash" cutting oils. (P10, Q29, G21, CN, Al)

367-P. (French.) **Electrochemical Behavior of Tungsten. Voltage pH Diagram of the W-H_2O System at 25° C.** E. Deltombe, N. de Zoubov and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 32, 1956, 10 p.

Conclusions are drawn relative to the general properties of tungsten and its oxides, particularly the stability, corrosion and electrodeposition of tungsten, and the stability of tungsten oxides and tungstic solutions. (P15, L17, R1 W)

368-P. (French.) **Standard Free Enthalpies of Formation at 25° C.** *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 28, 1955, 9 p.

Table of values of free enthalpies of formation for substances that would be considered in studying the electrochemical behavior of metals and metalloids in aqueous solutions at 25° C. (P12, P15)

369-P. (German.) **Conductivity Variation of Thin Evaporated Silver Film**

During Electrostatic Charge. A. Deubner and K. Rambke. *Annalen der Physik*, v. 17, no. 6-8, 1956, p. 317-328.

Method of recording and measurement of conductivity changes due to variation in free electrons. (P15, L25, Ag)

370-P. (German.) **Determination of Surface Tension of Pure and Alloyed Steel.** Wilhelm vor dem Esche and Oskar Peter. *Archiv für das Eisenhüttenwesen*, v. 27, no. 6, June 1956, p. 355-366.

Review of literature data, experimental measurement of surface tension of liquid iron and of phosphorus and silicon steels. (P10, Fe, AY)

371-P. (German.) **Heat Conductivity of Glass-Like Selenium.** H. J. Orthmann and K. Ueberreiter. *Kolloid-Zeitschrift*, v. 147, no. 3, June 1956, p. 129-131.

Calculation of heat conductivity in the range from 0 to 50° C. Explanation of the heat conductivity decrease in the freezing range. (P11, Se)

372-P. (German.) **Emission of Electrons in a Plastic Deformation of Zinc Single Crystals.** J. Lohff. *Zeitschrift für Physik*, v. 145, no. 4, 1956, p. 504-507.

Effect of mechanical finishing of sheet metal on the emission of electrons. (P15, Q24, Zn)

373-P. Liquid Metals. IV. The Wetting of Zinc by Liquid Sodium; the Significance of the Critical Wetting Temperature. C. C. Addison, W. E. Addison, D. H. Kerridge and J. Lewis. *Chemical Society, Journal*, June 1956, p. 1454-1461 + 2 plates.

Measurement of contact angles over ranges of time and temperature. Electropolished zinc surfaces show a critical wetting temperature near 160° C. (P10, Na, Zn)

374-P. A Rapid Method for Measuring Coercive Force and Other Ferromagnetic Properties of Very Small Samples. G. W. Van Oosterhout. *Applied Scientific Research*, v. 6, sec. B, no. 1-2, 1956, p. 101-104.

A method for the quantitative investigation of samples of about 1 m.g. is based essentially on the measurement of the alternating e.m.f. generated by letting the sample vibrate in a search-coil. (P16)

375-P. Heat Capacity of Dysprosium From 15 to 300° K. Maurice Griffel, R. E. Skochdopole and F. H. Spedding. *Journal of Chemical Physics*, v. 25, July 1956, p. 75-79.

The thermodynamic functions of dysprosium calculated. (P12, Dy)

376-P. Equilibria of Sulfur and Oxygen Between Liquid Iron and Open Hearth-Type Slags. H. L. Bishop, Jr., H. N. Lander, N. J. Grant, and J. Chipman. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, July 1956, p. 862-868.

Effects of slag composition and temperature on the iron oxide activity, distribution of sulfur between slag and metal, carbon content of the metal. Includes an over-all reaction for the equilibrium between sulfur and oxygen. (P12, B21, D2, Fe)

377-P. Hydrogen Overpotential at Electrodeposited Nickel Cathodes in Hydrochloric Acid Solutions. I. A. Ammar and S. A. Awad. *Journal of Physical Chemistry*, v. 60, July 1956, p. 837-841.

Measurements carried out in the current density range of 10^{-6} to 10^{-2} amp. per sq.cm. (P15, L17, Ni)

378-P. A Calorimetric Investigation of Some Binary and Ternary Liquid Alloys Rich in Tin. O. J. Kleppa. *Journal of Physical Chemistry*, v. 60, July 1956, p. 842-846.

Measurement on the heat of solution of indium, antimony, copper and gold in liquid tin. (P12, In, Sb, Cu, Au, Sn)

379-P. Heat of Formation of Solid and Liquid Alloys in the Systems Silver-Cadmium, Silver-Indium and Silver-Antimony at 450°. O. J. Kleppa. *Journal of Physical Chemistry*, v. 60, July 1956, p. 846-852.

The heats of formation of the solid alloys by the tin solution technique. (P12, Ag, Cd, In, Sb, Sn)

380-P. Heat of Formation of Solid and Liquid Binary Alloys of Copper With Cadmium, Indium, Tin and Antimony at 450°. O. J. Kleppa. *Journal of Physical Chemistry*, v. 60, July 1956, p. 852-858.

Data compared with earlier calorimetric work. (P12, Cu, Cd, In, Sn, Sb)

381-P. Heat of Formation of Some Solid and Liquid Binary Alloys of Gold With Cadmium, Indium, Tin and Antimony. O. J. Kleppa. *Journal of Physical Chemistry*, v. 60, July 1956, p. 858-863.

Heats of solution determined at 450° C. (P12, Au, Cd, In, Sn, Sb)

382-P. The Effect of Some Corrosion Inhibitors and Activators on the Hydrogen Overpotential at Fe Cathodes in NaOH Solutions. I. A. Ammar and S. A. Awad. *Journal of Physical Chemistry*, v. 60, July 1956, p. 871-874.

Measurements made in 0.2 *N* sodium hydroxide solutions to which organic substances were added. (P15, R10, Fe)

383-P. Surface Tension at Elevated Temperatures. III. Effect of Cr, In, Sn and Ti on Liquid Nickel Surface Tension and Interfacial Energy With Al_2O_3. C. R. Kurkjian and W. D. Kingery. *Journal of Physical Chemistry*, v. 60, July 1956, p. 961-963.

Determinations made by the sessile drop method. (P10, Cr, In, Sn, Ti, Ni)

384-P. Conversion Calculator. K. E. G. Meredith. *Metal Industry*, v. 89, July 6, 1956, p. 10-11.

To simplify the process of interconversion of weight and atomic per cent for binary systems, a simple compact calculator, with which only one setting is required, was developed. (P10)

385-P. Trapped Flux in Impure Superconductive Tin. J. I. Budnick, E. A. Lynton and B. Serin. *Physical Review*, v. 103, ser. 2, July 15, 1956, p. 286-291.

Measurements of percentage of trapped flux in cylindrical tin samples containing antimony, bismuth, or indium, with particular regard to the effect of annealing. (P15, Sn)

386-P. Radiochemical Studies of the Interaction of Lead With Protons in the Energy Range 0.6 to 3.0 Bev. R. Wolfgang, E. W. Baker, A. A. Caretto, J. B. Cumming, G. Friedlander and J. Hudis. *Physical Review*, v. 103, ser. 2, July 15, 1956, p. 394-403.

Lead targets were bombarded with protons of several energies between 0.6 and 3.0 Bev and formation cross sections determined for about 30 nuclides of A <140 produced in these bombardments. (P13, M25, Pb)

387-P. Rotational Losses in 4-79 Molybdenum Permalloy at Low Frequencies. Joseph M. Kelly. *Physical Review*, v. 103, ser. 2, July 15, 1956, p. 499-500.

Lag in rotation of magnetization when the superimposed magnetic field is rotated. (P16, SG-n, Mo)

388-P. Impurity Band Conduction in Germanium and Silicon. Esther M. Conwell. *Sylvania Technologist*, v. 9, July 1956, p. 82-84.

Electric current in a semiconductor can occur not only in the conduction and valence bond bands, but also in impurity bands. Since it seems now to be well established for Ge and Si, elementary concepts are discussed to clarify the theory. (P15, Ge, Si)

389-P. (Czech.) **Growth of Cast Iron in Cast-Iron Molds Used for Casting Steel.** Josef Pribyl. *Hutnik*, v. 6, no. 4, Apr. 1956, p. 106-113.

Primary growth is increase in volume due to the decomposition of carbides, especially cementite. Factors affecting this growth include structure and chemical composition of the cast iron, the relation between temperature and diffusion, casting technique and the like. (P10, N8, T5, CI, ST)

390-P. (French.) **Optical System for Easily Determining the Fusion Point.** L. Nicolas and J. Mansel. *Chimie Analytique*, v. 38, no. 7, July 1956, p. 258.

Some elaborations of the Roth apparatus to make it possible to view simultaneously the fusion of the product being tested and the temperature scale. (P12)

391-P. (German.) **Chemical Behavior of Aluminum Materials. II.** *Aluminium Ranshofen, Mitteilungen*, v. 4, no. 1, Apr. 1956, p. 3-10.

The second part of a compendium on chemical properties of various substances in interaction with aluminum. Covers nonmetallic compounds, metals and metallic compounds in the inorganic, and aliphatic and aromatic compounds in the organic field. (P13, Al)

392-P. (German.) **Effect of Additions on the Electric Conductivity of Copper. I. Electric-conductivity of Pure Copper, Its Maximum Value and the Effect of Admixtures.** Franz Pawlek and Karl Reichel. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 347-356.

Electric conductivity and temperature coefficient measurements. A survey of the solubility in copper for 49 elements and of the atomic increase of resistance in copper for 30 elements. (P15, N12, Cu)

393-P. (German.) **The Influence of Additions on the Electric Conductivity of Copper. II. Effect of Several Metallic Inclusions and of Oxygen on the Electric Conductivity of Copper.** Franz Pawlek, Klaus Viessmann and Helmut Wendt. *Zeitschrift für Metallkunde*, v. 47, no. 6, June 1956, p. 357-363.

Simultaneous metallic additions have a cumulative effect on the electric resistance as long as their amounts keep within limits.

394-P. (Polish.) **Thermodynamic Properties of Some Metal Alloys.** Andrzej Block-Bolten. *Archiwum Hutnictwa*, v. 1, no. 1, 1956, p. 11-51.

Relations are given for activity coefficients, partial molal heat of solution, heat of formation and partial and total pressures of vapor over solutions. (P12)

395-P. (Polish.) **Coefficients of Activity of Nonferrous Metals Giving Eutectics.** Wladyslaw Ptak. *Archiwum Hutnictwa*, v. 1, no. 1, 1956, p. 53-97.

Data includes dependence of ac-

tivity coefficients on composition, dependence of molecular heats of dissolution on composition and whole heats required to obtain a solution. (P12)

396-P. The Change of Thermal Electromotive Force of Metals Due to Plastic Deformation. N. F. Kunin. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 237-243.

Relation between the plastic deformation characteristics and the induced thermo-electromotive force. Induction of thermo-electromotive force in various kinds of plastic deformation. Induced thermo-electromotive force versus absorbed energy. (P15, Q24)

397-P. (Russian.) **Thermal Expansion of Silicon and Its Iron Alloys.** P. V. Gel'd, N. N. Serebrennikov and P. M. Sokharev. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 244-253.

A study of heat expansion curves of iron-silicon alloys within the 100-1000° C. temperature range. Offers empirical formulas for the temperature dependence of linear expansion coefficients of silicon and of some of its iron alloys. (P11, Si, Fe)

398-P. (Russian.) **The Influence of the Cooling Rate in Thermomagnetic Treatment on the Magnetic Properties of Cold-Rolled Transformer Steel.** D. D. Mishin and M. M. Belenkova. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 370-374.

Determines the dependence of changes in the magnetization curve, magnetostriction and coercive force on the cooling rate. The lower the rate, the stronger its effect. The effect of the thermomagnetic treatment is anisotropic. (P16, SG-p, ST)

399-P. (Russian.) **On the Solubility of Oxygen in Liquid Nickel and Iron-Nickel Alloys.** A. M. Samarin and V. P. Fedotov. *Izvestiia Akademii nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* no. 6, June 1956, p. 119-125.

Mechanism of solution. Comparison of experimental data with certain literary data. Solution of oxygen in liquid nickel is accompanied by a penetration of nickel oxide into the metal. (P13, N16, Ni, Fe)

400-P. The Enthalpy of a 0.12% Carbon Steel. J. R. Pattison and T. H. Lonsdale. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 284-286.

From enthalpy data obtained by water calorimetry, values were assigned to the heats of transformation at the γ to $\delta + \gamma$ phase change temperature (1467° C.), the peritectic temperature (1481° C.), and the liquidus temperature (1509° C.). (P12, CN)

401-P. On the Mechanism of Irradiation Annealing. R. S. Barnes and M. J. Makin. *Journal of Nuclear Energy,* v. 2, June 1956, p. 291-298.

The observed irradiation annealing of copper can be satisfactorily accounted for if an interstitial atom can eventually migrate with little loss of energy through the crystal lattice. (P15, J23, Cu)

402-P. (French.) **Radiation Damage in Metals.** Robert Scimar. *Revue Universelle des Mines,* v. 12, ser. 9, no. 7, July 1956, p. 185-199.

Various types of radiations and their possible effects on electrical, mechanical, crystallographic and physical properties.

(P general, Q general, M26)

Q

Mechanical Properties and Test Methods; Deformation

685-Q. Thermal-Cycling Test of a Hot Spot on a Vessel. P. N. Randall and H. A. Lang. *ASME, Transactions,* v. 78, July 1956, p. 1003-1009; disc., p. 1009-1010.

Tests on a catalytic-cracker regenerator shell revealed no evidence of cracking or of deterioration of the metallic structure. (Q7)

686-Q. Some Cases of Stress Due to Temperature Gradient. D. J. Bergman. *ASME, Transactions,* v. 78, July 1956, p. 1011-1017; disc., p. 1017-1019.

A qualitative analysis of the stress due to a maintained temperature differential in a flat bar is given for both free and restrained bar, and a comparison with the cases of a flat plate and a thick pipe. (Q25)

687-Q. Study of Die Wear by Means of Radioactivated Surfaces. B. J. Jaoul. *ASME, Transactions,* v. 78, July 1956, p. 1135-1139.

Radioactive techniques were successfully applied to the wear of a die face during hot extrusion of steels. (Q9, S19, F24, ST)

688-Q. The Mechanical Properties of Binary and Ternary Magnesium Alloys Containing Lithium. W. R. D. Jones. *Institute of Metals, Journal,* v. 84, June 1956, p. 364-387 + 1 plate.

Magnesium-lithium-base alloys compare favorably on a strength-weight basis with the strongest commercial aluminum-base alloys; they exhibit high ductility but poor work-hardening qualities and lack stable mechanical properties. (Q23, Mg, Li)

689-Q. New Apparatus For Friction Measurement. P. J. Willson, S. B. Twiss and D. M. Teague. *ISA Journal,* v. 3, July 1956, p. 224-228.

Apparatus consists essentially of a variable speed, heated metal disk against which a flat test specimen is pressed by dead weight loading. Unique instrumental features are the automatic linear increase of disk temperature, continuous recording of strain and semi-automatic control, and recording of other test variables. (Q9)

690-Q. External Strain-Gage Instrumentation at Transient Elevated Temperatures. Irving Sherlock and Robert C. Geiger. *ISA Journal,* v. 3, July 1956, p. 236-240.

Circuit requirements, calibration, temperature compensation, characteristics of etched foil strain gages for use during transient temperatures to 500° F. and installation procedure. (Q25)

691-Q. Effect of Neutron Irradiation Upon the Young's Modulus and Internal Friction of Copper Single Crystals. Donald O. Thompson and David K. Holmes. *Journal of Applied Physics,* v. 27, July 1956, p. 713-723.

Measurements of neutron irradiation effects upon single crystals of 99.999% purity at room temperature. (Q21, Q22, Cu)

692-Q. Strain-Amplitude Dependent Internal Friction Studies of Dilute Alloys of Copper. S. Weinig and E. S. Machlin. *Journal of Applied Physics,* v. 27, July 1956, p. 734-738.

Investigates the room-temperature decrement in dilute polycrystalline alloys of silicon and aluminum as a function of strain amplitude and annealing at a frequency of about 1 cycle per second. (Q23, J23, S, Cu)

693-Q. Application of Dislocation Theory to Internal Friction Phenomena at High Frequencies. A. Granato and K. Lücke. *Journal of Applied Physics,* v. 27, July 1956, p. 789-805.

Data concerning the damping of mechanical vibrations in the kilocycle and megacycle range. (Q22, M26)

694-Q. Creep of Aluminum Single Crystals. J. Weertman. *Journal of Applied Physics,* v. 27, July 1956, p. 832-834.

The stress range was studied from 157 to 616° C. (Q3, Al)

695-Q. How Metals Perform Under Repeated Impact. E. L. Layland. *Materials & Methods,* v. 44, July 1956, p. 104-105.

Comparative ratings are given for a number of wrought and cast materials, both ferrous and nonferrous. (Q6, Q7)

696-Q. Precision Measurements of Force. Arthur C. Ruge. *Metal Progress,* v. 70, July 1956, p. 92-93.

Strain gage dynamometers have been adopted by the National Bureau of Standards for calibration of loads and forces too large to be handled by proving rings. (Q general, S general)

697-Q. Photoelastic Investigation of Stresses in Conical Head Pressure Vessels. L. W. Smith and G. K. Cooper. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 7-20.

Analysis of stresses in the knuckle region of two conical head models machined from solid blocks of Fosterite. (Q25)

698-Q. The Interference Screen Method for Isopachic Patterns (Moiré Method). G. Mesmer. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 21-26.

New procedures use the system of fine lines of equal thickness in a model originally not being optically flat as a screen to build the isopachic lines by the moiré effect. (Q25)

699-Q. Simulated Service Testing. L. F. Kooistra. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 39-48.

Several methods employed in the power generation field, together with some data comparing test results with actual operation. (Q7, S21)

700-Q. Structural Testing of Aircraft Propellers. D. G. Richards. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 49-56.

Procedure involves vibration stress surveys conducted on the airplane in question, laboratory fatigue tests and service sampling. (Q7, S21)

701-Q. Methods of Waterproofing SR-4 Strain Gages. P. M. Palermo. *Society for Experimental Stress Analysis, Proceedings,* v. 13, no. 2, 1956, p. 79-83.

The barrier coat and rubber patches, Okonite-tape, and barrier coat and neoprene compound methods were tested for use on the outer hull of submarines. (Q25)

702-Q. Three Dimensional Photoelastic Analysis of Shafts in Pure Tor-

sion and a Comparison With Results From Relaxation. R. C. Johnson. *Society for Experimental Stress Analysis, Proceedings*, v. 13, no. 2, 1956, p. 107-116; disc., p. 117-118.

The relaxation method is preferable for pure torsion analysis of shafts having symmetric solid cross-sections, whereas the photoelastic method is preferable for shafts having multiple-connected cross-sections or variable diameter. (Q25, Q1)

703-Q. Photoelastic Evaluation of Individual Principal Stresses by Large Field Absolute Retardation Measurements. D. Post. *Society for Experimental Stress Analysis, Proceedings*, v. 13, no. 2, 1956, p. 119-132.

Large-field interferometric techniques for absolute retardation measurements make possible simple and rapid evaluation of individual principal stresses throughout two-dimensional models. (Q25)

704-Q. The Mechanical Properties of Certain Steels as Indicated by Axial Dynamic Load Tests. R. C. Smith, T. E. Pardue and I. Vigness. *Society for Experimental Stress Analysis, Proceedings*, v. 13, no. 2, 1956, p. 183-197.

The influence of strain rate on the shape of the stress-strain curves for several steel materials was investigated. (Q27, ST)

705-Q. Properties of Arc-Welded Joints Between Aluminum and Stainless Steel. M. A. Miller and E. W. Mason. *Welding Journal*, v. 35, July 1956, p. 323s-328s.

Joint preparation and design and data on the performance of metallurgically bonded aluminum-steel joints. (Q21, Q7, K1, Al, SS)

706-Q. Investigation of Static and Fatigue Resistance of Model Pressure Vessels. Julien Dubuc and Georges Welter. *Welding Journal*, v. 35, July 1956, p. 329s-337s.

Results indicate remarkable performance for vessels subjected to extreme static cyclic loading. (Q23, Q7)

707-Q. Welded Top Plate Beam-Column Connections. R. Ford Pray and Cyril Jensen. *Welding Journal*, v. 35, July 1956, p. 338s-347s.

A method of analyzing a top plate and seated beam-column connection, accompanied by a test of a built-up two-way beam-column connection to verify it. (Q25, K1)

708-Q. (Czech.) **Study of the Internal Cohesion of Deep Drawn Steel.** Bohumil Otta. *Hutnik*, v. 6, no. 5, May 1956, p. 133-135.

Effect of the nonhomogeneity of the ingot and of other factors on the deep drawing qualities. Differences in hydrogen content may contribute to the varying degrees of cohesion. Some improvement in internal cohesion with aging. (Q23, G4, N7, CN)

709-Q. (Czech.) **Fatigue Limits of Screws.** F. Benes. *Strojirenstvi*, v. 6, no. 6, June 1956, p. 388-394.

Influence of material and its properties. Mechanical properties of bolts manufactured of various materials and heat treated for uniform strength. (Q7, T7)

710-Q. (Czech.) **Improving the Resistance of Machine Parts to Abrasive Wear.** K. Löbl, J. Nainar and R. Starek. *Strojirenstvi*, v. 6, no. 6, June 1956, p. 395-405.

Various kinds of abrasive wear common in pneumatic installations. Method of tests, their results and evaluation from the point of view of practical application. (Q9)

711-Q. (French.) **Mechanical Characteristics of Gray Cast Iron. Verification of the Diagram Drawn Up by A. Collaud.** Michel Ferry. *Fonderie*, no. 124, May 1956, p. 177-184.

Classification of cast irons according to their strength, measured on a test piece taken from a 30-mm. diam. bar. (Q23, CI)

712-Q. (French.) **Mechanical Hysteresis of Metals at High Temperature.** C. Boulanger and C. Crussard. *Métaux, Corrosion-Industries*, v. 31, no. 369, May 1956, p. 203-213.

Investigates influence of polygonization on the modulus of elasticity and on internal friction, heats of activation, critical temperatures and the form of stress-deformation cycles. (Q21, N5, Q22, P12)

713-Q. (French.) **Hard Sintered Alloys and Their Use at High Temperatures.** R. Kieffer, K. Kölbl and K. Pfaffinger. *Métaux, Corrosion-Industries*, v. 31, no. 369, May 1956, p. 233-243.

Properties of titanium carbide alloys and their use in jet-engine and rocket construction. (Q3, Q4, T25, SG-j, SG-h)

714-Q. (German.) **Forming and Separating Failure in Ferrite Nodular Graphite Cast Iron.** H. Morrough and G. N. J. Gilbert. *Giesserei*, v. 43, no. 14, July 5, 1956, p. 361-368.

Impact tests, effect of chemical composition on brittleness, embrittlement through quenching at temperatures below the transformation region. (Q23, Q6, J26, CI)

715-Q. (Polish.) **The Anisotropy of Cold Formed Polycrystalline Metals.** Wojciech Truszkowski. *Archiwum Hutnictwa*, v. 1, no. 2, 1956, p. 171-182.

New method of calculation consists of measuring deformation in the neck of a strained test piece and calculating the anisotropy coefficient for several cross sections with increasing distance from the smallest cross section in the neck. (Q27, Q24)

716-Q. (Russian.) **The Effect of Nitriding on the Oscillation Decrement in Certain Steels at Normal and at Elevated Temperatures.** M. M. Pisarevskii and S. V. Dianov. *Energomashinostroenie*, no. 5, May 1956, p. 22-24.

Experimental data for a wide range of temperatures on certain pearlite and austenite steels widely used in turbine building. For pearlitic steels, nitriding is found to reduce the oscillation decrement; the opposite is observed in the case of austenitic steels. (Q8, J28, T25, ST)

717-Q. (Russian.) **Fatigue Strength of Steel Plates With Welded Straps.** I. V. Kudriavstev and N. A. Balabanov. *Svarochnoe Proizvodstvo*, no. 6, June 1956, p. 1-5.

Results of fatigue tests show that their strength is considerably lower than that of plates without straps. High annealing of plates with straps improve their fatigue strength. Normalizing of such plates improves their strength still further. (Q7, J23, ST)

718-Q. (Russian.) **The Strength of Metals Welded During the Process of Crystallization.** N. N. Prokhorov. *Svarochnoe Proizvodstvo*, no. 6, June 1956, p. 5-11.

Existing hypotheses and suggests an original one regarding the strength of metals. Methods of testing strength of these metals. (Q23, N5, K1)

719-Q. (Russian.) **A Study of T-Connections Under Action of a Variable Load.** V. Iu. Shishkin, V. A. Makurin and R. Z. Manilova. *Svarochnoe Proizvodstvo*, no. 6, June 1956, p. 11-13.

In welded T-connections, the tensile strength of the joint can be made equal to that of the base metal even if the butted ends have not been fused through completely. Investigates the permissible extent of nonfusion in the joints as well as the effect of an eccentricity in welded parts on the strength of the connection. (Q23, K1)

720-Q. (Russian.) **Impact Tests of Welded Joints.** D. I. Navrotskii. *Svarochnoe Proizvodstvo*, no. 6, June 1956, p. 14-17.

Methods and results of impact tests of welded specimens for determining the critical brittleness and yield points, relative elongation and relative reduction in area. Tensile and bending impact strength of welded joints is found to be not lower than that of the base metal. (Q6, Q27, K9)

721-Q. (Russian.) **On the Calculation of Stress Relaxation in Metals.** L. M. Shestopalov. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 5, May 1956, p. 1021-1033.

A mathematical treatment of the problem of relaxation leading to the concept that stress relaxation is indicative of an internal reorganization of the lattice of the real crystal in a nonequilibrium state. (Q25, Q3, M26)

722-Q. (Spanish.) **Tempering Deformations in 12% Chromium and 2% Carbon Ledeburitic Steel.** Francisco Joanxich Ayma. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 364-369.

Investigates influence of tempering temperature on deformability. (Q24, J29, AY)

723-Q. (Spanish.) **Theoretical Systematic Test to Study the Strength of Gray Iron.** Jose Navarro Alcacer. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 425-431.

Effect of graphite shape and size in the metallic matrix. (Q23, M27, CI)

724-Q. (Spanish.) **Etchants for the Study of Temper Brittleness.** Francisco Munoz del Corral, Jose M. Bermudez De Castro y Mosquero. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 478-484.

Study of various etchants proposed for metallographic examination of temper brittleness by using ether solutions of picric acid and alkaline potassium permanganate, an adequate correlation is obtained between the impact values and the microscopic appearance of the test pieces. (Q23, M21)

725-Q. (Spanish.) **Investigation of the Fatigue Strength of Butt-Welded Joints in a Weldable "Lloyd"-Type Spanish Steel.** Zosimo Garcia Martin. *Instituto del Hierro y del Acero*, v. 9, no. 46, May 1956, p. 519-535.

Study of the fatigue strength, under dynamic bending and traction forces, of the base metal, and the effect that the butt-welded joint and the extra thickness of the welding bead have on this strength. (Q7, K3, AY)

726-Q. Internal Stress in Castings. *Foundry Trade Journal*, v. 101, July 5, 1956, p. 19-27.

Review of earlier work, followed by a description of experiments on casting triangular gray-iron grids and determining stress distributions. General recommendations are made on methods for the reduction of internal stress. (Q25, E general, CI)

727-Q. Cause and Prevention of Brittleness in Steel. *Mechanical World and Engineering Record*, v. 136, July 1956, p. 328-331.

Notes from recent research to aid design and construction. (Q23)

728-Q. Electronic Unit Tests Hardness of Gun Barrels. David E. Driscoll and Samuel J. Acquaviva. *Metalworking Production,* v. 100, July 6, 1956, p. 1032-1033.

Electronically operated and controlled bore-hardness tester can accurately measure a 17-ft. tube with bore diameters of 2½ to 4 in. (Q29, ST)

729-Q. Measurement Methods for Wear in Pipe Line Engines and Compressors. J. L. Wilson and S. R. Sawyer. *Pipe Line News,* v. 28, July 1956, p. 36-40.

Analysis of used lubricating oil samples with the emission spectrograph; correlation of the analyses with measured wear rates in engines and with part failures. (Q9)

730-Q. Designing Strain Gage Circuits for Sensitivity and Linearity. Peter K. Stein. *Product Engineering,* v. 27, July 1956, p. 144-149.

Comparison of bridge and potentiometer strain-gage circuits; significance of sensitivity ratings and design for maximum sensitivity; determination of nonlinearity of response. (Q25)

731-Q. Creep Tester Makes Three Basic Tests. *Product Engineering,* v. 27, July 1956, p. 162-163.

Machine uses two head assemblies and a motor-driven leading screw to make possible three types of tests. A compound loading lever which is counterbalanced and kept level makes the unit compact and accurate. (Q3)

732-Q. Elastic Deformation and the Laws of Friction. J. F. Archard. *Research (Supplement),* v. 9, July 1956, p. S27-S28.

Theoretical analysis suggests that the frictional force may be proportional to the area of contact regardless of the mechanism of deformation. (Q9, Q21)

733-Q. Device for Applying Compression to Small Crystals. Eugene J. Rapperport. *Review of Scientific Instruments,* v. 27, July 1956, p. 446-447.

Applies uniaxial compression to specimens with cross sections up to ¼ in. sq. (Q28)

734-Q. The Yield Behaviour of Mild Steel in Dynamic Compression. J. D. Campbell and J. Duby. *Royal Society, Proceedings,* v. 236, ser. A, July 10, 1956, p. 24-40 + 2 plates.

Stress-time curves are obtained and analyzed in terms of wave propagation and a dynamic stress-strain relation is derived. Micrographs show that coarse slip does not occur, though there is some evidence of fine slip and grain boundary movement. (Q28, Q24, ST)

735-Q. Bending Tests of Ring-Stiffened Circular Cylinders. James P. Peterson. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3735, July 1956, 14 p.

Twenty-five cylinders were loaded to failure in bending and results are presented in the form of design curves which are applicable to cylinders with heavy rings that fail as a result of local buckling. (Q5)

736-Q. (English.) Comparison of Theoretical and Experimental Results for 24S-T and 75S-T Aluminium Alloy Columns Buckling in the Elastic and Inelastic Ranges. Bo Braathen and Bryan R. Noton. *Aeronautical Research Institute of Sweden, Report* 66, 1956, 31 p.

Theoretical results are based on the tangent-modulus theory, the reduced-modulus theory, and the extended Southwell method. Curves indicate that the experimental values are sufficiently well represented by the simple tangent-modulus theory. (Q28, Al)

737-Q. (English.) Effect of Crack Length and Stress Amplitude on Growth of Fatigue Cracks. Waloddi Weibull. *Aeronautical Research Institute of Sweden, Report* 65, 1956, 44 p.

The growth rate was strongly influenced by small variations in the mean stress amplitude of an interval. For the tested specimens the rate of growth seemed completely independent of the crack length. (Q7)

738-Q. (Czech.) Effect of Flame Straightening on the Fatigue Limit of Edged C-Profiles. Ondrej Puchner. *Zvaranie,* v. 5, no. 4, Apr. 1956, p. 104-106.

Flame straightening of parts of automobile frames is tested to see whether the fatigue limit of the high tensile steels is adversely affected. (Q7, F29, AY)

739-Q. (French.) A Contribution to the Study of Modified Heat-Resistance 80-20 Ni-Cr Alloys. M. Mathieu. *Recherche Aéronautique,* no. 51, May-June, 1956, p. 43-51.

A study to determine reasons for breaking of turbine blades. X-ray studies indicate a preferential migration of certain atoms which are a prelude to the formation of precipitates. High degree of homogeneity is necessary to preserve desired properties. Effects of "skin-annealing" on micrographic structure. (Q26, S21, SG-h, Ni, Cr)

740-Q. (French.) An Analysis of the Notched Bar Impact Test and of the Mechanism of Brittle Fracture. C. Crussard, R. Borione, J. Plateau, Y. Morillon and F. Maratray. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 426-460.

A statistical analysis of the scattering of impact values in the transition field. A new microfractographic method for observation of the fracture appearance with the electronic microscope. Tensile tests at low temperature. (Q6, Q23, ST)

741-Q. (German.) Influence of Internal Oxidation on the Technical Properties of Silver Alloys. E. Raub and W. Plate. *Metall,* v. 10, no. 13-14, July 1956, p. 620-626.

Internal oxidation is usually followed by an increase in hardness, a decrease in tensile strength and reduced ductility. Though generally disadvantageous, internal oxidation can be used in manufacturing certain materials which normally are produced only by sintering. (Q23, Q29, R2, Ag)

742-Q. (German.) The Dependence of the Elasticity Modulus on the State of the Material in the Case of a Silver Alloy. A. Keil. *Metall,* v. 10, no. 13-14, July 1956, p. 626-628.

A report on measurements of elasticity modulus, tensile strength, ductility and hardness of certain homogeneous silver-cadmium alloys and of those heterogenized by internal oxidation. (Q21, Q23, Q29, R2, Ag, Cd)

743-Q. (German.) Mechanical Requirements for Copper Wire in Bending and Winding Work. Fritz O. Glander. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 364-369.

The influence of bending and simultaneous additional tensile load on the mechanical properties of soft and hard copper wire. (Q5, G6, Cu)

744-Q. (German.) Hardness of Copper-Manganese-Nickel Alloys. II. Investigation of Electrical Resistance. Otto Dahl and Karl-Ludwig Dreyer. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 370-378.

The change in electrical resistance in relation to temperature and time of hardening was measured. (Q29, P15, J27, Cu, Mn, Ni)

745-Q. (German.) Tensile Deformation of Copper Single Crystals. II. Linear Inhomogeneity and Reproducibility of Stress-Strain Curves. Jörg Diehl. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 411-416.

Inhomogeneities of strain are primarily due to pronounced variations of the coefficient of work hardening in stage I of the stress-strain curve. Phenomena may be caused by fluctuations in the linear structure of the crystals. (Q24, Q27, Cu)

746-Q. (Portuguese.) Limitations in the Use of Hardness Tests as a Method of Investigation of the Mechanical Properties of Tempered and Annealed Steels. Alberto Albuquerque Arantes. *ABM (Boletim da Associacao Brasileira de Metais),* v. 12, no. 43, Apr. 1956, p. 135-143.

Analysis of the relationships between hardness, tensile strength, impact value and wear resistance of various steels, showing the inadequacy of hardness tests as a method of investigating mechanical properties, even when the chemical composition of the steel and its Jominy curve are known. (Q general, Q29, ST)

747-Q. (Russian.) A Radiographic Study of Phenomena Accompanying Stretching of Steel Over Extended Periods at Higher Temperaures. M. Ia. Fuks, N. V. Slonovskii and L. I. Lupilov. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 328-338.

A quantitative radiographic evaluation of the degree of diminution of cohesion domains and of the magnitude of microstresses in carbon and chromium-nickel-molybdenum steels plastically deformed by stretching at various temperatures and rates. ((Q24, Q25, ST)

748-Q. (Russian.) Vickers and Rockwell Hardness as Functions of the Plastic Parameters of the Metal and of the Test Conditions. G. P. Zaitsev. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 339-350.

Deduces formulas and plots curves of errors in hardness measurements to take account of the deviation of actual test conditions from the norm, and to allow for the plastic properties of individual metals. (Q29, Q23,)

749-Q. (Russian.) The Influence of the Cross-Sectional Configuration of the Specimen on the Magnitude of Axial Deformation Stresses in Compression. V. E. Panin. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 357-360.

An experimental proof of the theoretical conclusion that magnitude of axial stresses depends on the form of the cross section of specimens of the same cross-sectional area. (Q28, Q25)

750-Q. The Problem of Fatigue Strength in Aircraft Structures. E. Gassner. *Aircraft Engineering,* v. 28, July 1956, p. 228-234.

A survey with recommendations for design rules based on recent research. (Q7)

751-Q. A Fundamental Investigation of Hydrogen Embrittlement in Zirconium. Arthur P. Young and Charles M. Schwartz. *Battelle Memorial Institute, (U. S. Atomic Energy*

Commission), BMI-1100, June 1956, 21 p.

Hydrogen embrittlement in zirconium is apparently due to microcrack formation at hydride-zirconium interfaces. There is some evidence that embrittlement decreases with decreasing grain size and is abnormally enhanced by slow prestrain before impact. (Q23, Zr)

752-Q. The "Ploughing" Contribution to Friction. R. T. Spurr. *British Journal of Applied Physics,* v. 7, July 1956, p. 260-261.

Expressions are derived which enable the ploughing component to be calculated for two types of asperity, namely, spheres and wedges. (Q9, Cu, Al, ST)

753-Q. Crack Arresting by Overlays of Notch-Tough Weld Metal. P. P. Puzak and W. S. Pellini. *Bureau of Ships Journal,* v. 5, Aug. 1956, p. 9-12.

Demonstrates effectiveness of this technique by illustrated examples. (Q26, L24)

754-Q. Mechanical Properties of a Normalized and Drawn Cast Boron Steel. S. L. Gertsman, D. K. Faurschou and R. K. Buhr. *Foundry,* v. 84, Aug. 1956, p. 92-99.

Effects of rare earth additions on properties. (Q general, B22, ST)

755-Q. Wear Resistance. W. G. Cass. *Iron & Steel,* v. 29, July 1956, p. 342.

Recent Russian research on different surface treatments for machine parts. (Q9)

756-Q. Fracture in Metals. N. F. Mott. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 233-243.

Ductile fracture, brittle fracture especially of ferrous metals and fatigue discussed in terms of the theory of dislocations. (Q26, Fe)

757-Q. (English.) **Studies on the Wetting Effect and the Surface Tension of Solids, the Change in Cutting Resistance of Aluminium Due to Wetting by Several Liquids.** Mizuho Sato. *Japan Academy, Proceedings,* v. 32, no. 5, May 1956, p. 336-338.

With a test machine the cutting resistance is observed by the deflection of a beam which is constructed with two co-axial metallic cylinders. (Q29, P10, Al)

758-Q. The Embrittlement of Tungsten by Ammonia. G. L. Davis. *Metallurgia,* v. 54, no. 321, July 1956, p. 18-20.

The embrittling action seems to be due to reaction with ammonia itself, rather than its dissociation products, and is associated with the presence of nitride as an insoluble phase. (Q23, W)

759-Q. Influence of Rate of Load Application on the Tensile Strength of Cast Irons. H. K. Lloyd. *Metal Treatment and Drop Forging,* v. 23, July 1956, p. 281-287.

Extremes in testing speed can cause appreciable variations in the results of tensile-strength tests on cast iron which may be masked during routine testing. (Q27, CI)

760-Q. Resistance to Fatigue Stressing of Wood-to-Metal Joints Glued With Several Types of Adhesives. H. W. Eickner, E. A. Mraz and H. D. Bruce. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1545, July 1955, 9 p.

Shear and cantilever load tests were made on individual joints prepared with several processes. (Q7, K12)

761-Q. Fatigue of Sandwich Constructions for Aircraft. Aluminum Facing and Expanded-Aluminum-Honeycomb Core Sandwich Material Tested in Shear. Fred Werren. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1559-K, July 1952, 7 p.

Method of bonding core to facings is important factor in shear strength and fatigue properties. (Q7, Q2, Al)

762-Q. Strength of Aluminum Lap Joints at Elevated Temperatures. (Tests Conducted Immediately After the Temperature Was Reached.) Edward W. Kuenzi. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1808, May 1954, 33 p.

At elevated temperatures, the highest strengths were obtained with a high-temperature setting formulation of thermosetting resin and synthetic rubber. The highest strengths at room temperature were obtained with a high-temperature setting modified-phenol-polyvinyl butyral adhesive. (Q23, K12, Al)

763-Q. Nature of Plastic Deformation of Surface Zones of Working Parts. K. V. Savitskii and M. P. Zagrebennikova. *Henry Brutcher, Translation No.* 3765, 7 p. Henry Brutcher, Altadena, Calif. (From *Doklady Akademii Nauk SSSR,* v. 103, no. 4, 1955, p. 605-608.)

Previously abstracted from original. See item 1035-Q, 1955. (Q29, Al, Cu)

764-Q. (French.) **A Study of the Brittleness of Steel for Hulls Using U and V-Notch Charpy Tests.** A. Audige. *Revue de la soudure* (Brussels), v. 12, no. 2, Feb. 1956, p. 112-122.

Some recommended tests. Comparison of the French tests with those run in other countries. Tests on 41 to 50-kg. steels. (Q23, Q6, ST)

765-Q. (German.) **Deformation and Separation Cracks in Ferritic Nodular Graphite Cast Iron.** H. Morrogh and G. N. J. Gilbert. *Giesserei,* v. 43, no. 15, July 19, 1956, p. 390-397.

Thermal treatment and fine structure. Embrittlement as result of annealing at temperatures below transformation region. Comparison of cracks in notched and unnotched tension and impact tests. (Q general, J23, N8, CI)

766-Q. (German.) **Stress Distribution in Pretensioned Prestressed Beams Executed on Photoelastic Models With Various Eccentricities of Bond Stress.** H. H. Racké. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 22, no. 6, June 1956, p. 169-177.

Results of model studies. (Q25)

767-Q. (Book—German.) **Handbook of Materials Testing. Testing of Metal Materials.** E. Siebel, editor. v. II. 2nd Rev. Ed. 754 p. 1955. Springer-verlag, Berlin, Germany.

Metal fundamentals. Mechanical and physical testing methods. (Q general, P general)

768-Q. (Book.) **Society for Experimental Stress Analysis, Proceedings, (Annual Volume),** v. 13, no. 2, 1956, 197 p. Society for Experimental Stress Analysis, Central Square Station, P. O. Box 168, Cambridge 39, Mass.

Pertinent papers are individually abstracted. (Q25)

R Corrosion

369-R. Stress-Corrosion of Stainless Boilers. (Digest of "Stress Corrosion of Austenitic Stainless Steels in High Temperature Waters), by W. Lee Williams and John F. Eckel, *American Society of Naval Engineers, Journal,* v. 68, Feb. 1956, p. 93-104. *Metal Progress,* v. 70, July 1956, p. 152, 154, 156.

Oxygen with a chloride-ion content is especially bad in the steam phase on areas under mild stress, whereas oxygen alone gives little trouble. Controls described. (R1, SS)

370-R. Corrosion Problems Arising From the Use of Aluminium Alloys in H.M. Ships. I. J. C. Kingcome. *Corrosion Prevention and Control,* v. 3, June 1956, p. 31-34.

With cathodic protection it should be possible not only to prevent the corrosion of aluminum alloys in contact with copper alloys in sea-water, but to use copper-containing aluminum alloys for constructional purposes and so benefit from the much superior mechanical properties of these alloys. (To be continued.) (R10, R4, L26, Q general, Cu, Al)

371-R. Corrosion Control in Tankers by Cathodic Protection. J. S. Gerrard. *Corrosion Prevention and Control,* v. 3, June 1956, p. 37-38.

On a new ship, cathodic protection will be 80-90% effective. (R10)

372-R. Cathodic Protection and Shipping—Practical Considerations. A. W. Hubbard. *Corrosion Prevention and Control,* v. 3, June 1956, p. 47-49.

Application to tanker cargo-ballast compartments and to hull surfaces. Limitations of the galvanic system. (R10)

373-R. Corrosive and Erosive Effects of Acid Mine Waters on Metals and Alloys for Mine Pumping Equipment and Drainage Facilities. Anthracite Region of Pennsylvania. S. H. Ash, H. A. Dierks, E. W. Felegy, K. M. Huston, D. O. Kennedy, P. S. Miller and J. J. Rosella. *U. S. Bureau of Mines Bulletin 555,* 46 p. 1955.

Quality and character of anthracite mine waters, results of various corrosion tests, materials suitable for pumping equipment. (R4)

374-R. Mechanism of Water Pipe Corrosion. Rolf Eliasson and James C. Lamb, III. *Water & Sewage Works (Reference and Data Edition),* v. 103, June 1956, p. R99-R104.

Variables affecting rate and distribution of pipeline corrosion. Formation of corrosion cells. (R1, R4)

375-R. Report of Subcommittee VI, of Committee B-3, on Atmospheric Corrosion. H. R. Copson, chairman. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 3-19.

Tabulated data on 24 nonferrous metals and alloys which were exposed to the atmosphere at seven locations. (R3)

376-R. Resistance of Aluminum-Base Alloys to 20-Year Atmospheric Exposure. C. J. Walton and William King. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 21-44, disc., p. 45-46.

Discussion of 20-yr. atmospheric weathering data obtained on wrought aluminum-base alloys. Data correlated with more recent findings. (R3, Al)

377-R. Effect of 20-Year Marine Atmosphere Exposure on Some Aluminum Alloys. Fred M. Reinhart and

George A. Ellinger. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 47-64, disc., p. 65-66.

Tests on specimens of commercially available structural aluminum alloys. Data of three locations correlated. (R3, Al)

378-R. Effect of Natural Atmospheres on Copper Alloys: 20-Year Test. A. W. Tracy. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 67-76.

The corrosion resistance of 11 copper alloys exposed to industrial, marine and rural atmospheres. (R3, Cu)

379-R. The Atmospheric Corrosion of Copper—Results of 20-year Tests. D. H. Thompson, A. W. Tracy and John R. Freeman, Jr. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication no. 175. American Society for Testing Materials. p. 77-87.

Copper, in the form of sheet and wire, was exposed to four outdoor atmospheres in Connecticut and the effect of corrosion was evaluated. (R3)

380-R. Atmospheric Galvanic Corrosion of Magnesium Coupled to Other Metals. H. O. Teeple. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 89-115.

A total of 480 couples arranged in the forms of disks evaluated in four different locations. (R3, R1, Mg)

381-R. Galvanic Couple Corrosion Studies by Means of the Threaded Bolt and Wire Test. K. G. Compton and A. Mendizza. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 116-123; disc., p. 124-125.

Concludes that no very broad generalization can be made as to the relative severity of dissimilar-metal galvanic-couple corrosion; corrosion rate seems to be an arbitrary value. (R1, R3, R11)

382-R. The Atmospheric Corrosion of Rolled Zinc. E. A. Anderson. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 126-134.

Atmospheric corrosion of zinc is controlled principally by the frequency of rain and dewfall, the acidity of the moisture and the rate of drying. (R3, Zn)

383-R. The Use of Lead and Tin Outdoors. George O. Hiers and Elbert J. Minarcik. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 135-140.

Corrosion penetration showed chemical lead and antimonial lead are remarkably durable in all of the test site exposures. Losses in strength can be compensated. (R3, T26, Pb, Sn)

384-R. Atmospheric Corrosion Behavior of Some Nickel Alloys. H. R. Copson. Paper from "Symposium on Atmospheric Corrosion of Non-Ferrous Metals". ASTM Special Publication No. 175. American Society for Testing Materials. p. 141-158.

High-nickel alloys are very resistant to corrosion at marine and rural locations. (R3, Ni)

385-R. (Dutch.) **Cathodic Protection.** J. W. Boon. *Metalen*, v. 8, no. 10, May 31, 1956, p. 219-226.

Principle of cathodic protection, electrical and electrochemical considerations, galvanic method, reactions at the anode and cathode, criteria of complete protection, advantageous and deleterious secondary effects and practical results of application. (R10)

386-R. (Dutch.) **Corrosion Investigation by Means of Aerosols.** W. Hess-Bircher. *Metalen*, v. 11, no. 11, June 15, 1956, p. 239-245.

Physical basis of method. Practical tests. (R11)

387-R. (French.) **Observations of the Attack Mechanisms on High-Purity Aluminum by Water at High Temperature.** Jean Herenguel and Pierre Lelong. *Comptes Rendus*, v. 242, no. 25, June 18, 1956, p. 2941-2944.

Micrographic study of attack mechanisms on high-purity metal by water at 165 and 205° C. after electrolytic or chemical polishing. (R1, R4, Al)

388-R. (German.) **Stabilizing of Passive State of Austenite Chromium-Nickel Steels by Means of Anodic Polarization in Boiling 4N Sulfuric Acid.** Carl Carius. *Archiv für das eisenhüttenwesen*, v. 27, no. 6, June 1956, p. 401-412.

Potential measurements in oxygen-containing 4N sulfuric acid at room temperature and the boiling point. Study of passivation. (R10, SS)

389-R. (German.) **Corrosion and Corrosion Protection in Mining—Protection by Coal-Tar Products.** Franz Eisenstecken. *Werkstoffe und Korrosion*, v. 7, no. 6, June 1956, p. 310-321.

General corrosion problems, especially the harmful effect of mill scale on rolled or tempered iron and steel in relation to tar coating. (R7, L26, ST)

390-R. (German.) **Corrosion by Sulfuric Acid.** Johannes Bünger. *Werkstoffe und Korrosion*, v. 7, no. 6, June 1956, p. 322-330.

Corrosion resistance graphs for chromium, nickel, molybdenum, copper, steels and nickel-molybdenum alloy for a range of temperature up to boiling and concentration up to 95% sulfuric acid. (R6, AY)

391-R. (Russian.) **Dependence of the Cavitation Coefficient of the Hydraulic Turbine on the Soluble Air Content in Water.** L. S. Shmugliakov. *Energomashinostroenie*, no. 5, May 1956, p. 11-14.

Experimental data on the effect of dissolved air on the development of cavitation. Derivation of formulas relating the cavitation coefficient of a hydraulic turbine to the soluble air content of water. (R2)

392-R. A Study of the Reaction of Metals and Water. H. M. Higgins. *Aerojet-General Corporation, U. S. Atomic Energy Commission, AECD-3664*, Apr. 1955, 59 p.

Reactions of molten zirconium, Zircaloy-2, uranium, uranium-molybdenum alloy, aluminum, aluminum-lithium alloy and magnesium. (R4, P13, Zr, U, Mo, Al, Li, Mg)

393-R. Effect of Zinc Ion on Corrosion of 2S Aluminum, Type 347, and SAE 1020 Steel in Static Water at 500° F. C. Wohlberg. *Argonne National Laboratory (U. S. Atomic Energy Commisssion)*, ANL-5399, May 1956, 36 p.

A series of tests made to evaluate the influence of zinc ion on the corrosion behavior. (R4, SS, ST, Al)

394-R. Attack on Metals by Bismuth-Lead-Tin Alloy at Elevated Temperatures. W. D. Wilkinson. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5262, Jan. 1954, 73 p.

The metals tested included aluminum, Armco iron, cast iron, beryllium, titanium, zirconium and various steels. Various test procedures and types of tests employed. (R6)

395-R. An Investigation Into the Air-Heater Corrosion of Oil-Fired Boilers. B. Lees. *Combustion*, v. 28, July 1956, p. 38-42.

Methods which have been successfully applied to reduce the fouling and wastage, future experiments. (R9)

396-R. Plant Instruments in Corrosive Atmospheres. Leo Walter. *Corrosion Technology*, v. 3, July 1956, p. 221-225.

Design, installation and maintenance. (R3, T8)

397-R. Effect of Lubricant on Pitting Failure of Ball Bearings. F. T. Barwell and D. Scott. *Engineering*, v. 182, July 6, 1956, p. 9-12.

Experimental results for various fluids. (R2, ST)

398-R. Soldered Joints in Aluminium: Mechanism of Corrosion. W. J. Smellie. *Light Metals*, v. 19, July 1956, p. 210-214.

Quick electrochemical interface failure is to be expected on joints made from solders consisting of tin, lead and cadmium. Zinc-base solders are preferred where a wide range of service conditions is anticipated. (R1, K7, Al)

399-R. Location of Contact Between Cathodically Protected Lines and a Foreign Line. L. F. Heverly. *Pipe Line News*, v. 28, July 1956, p. 49-50, 54.

Contact between a cathodically protected pipe line and a bare water line in a distribution network can destroy the usefulness of a cathodic protection system unless steps are taken to electrically isolate one from the other. Procedure used to find the exact location of a contact with a water line underneath a reinforced concrete paved street. (R10)

400-R. The Oxidation of Aluminium in Dry and Humid Oxygen Atmospheres. R. K. Hart. *Royal Society, Proceedings*, v. 236, ser. A, July 10, 1956, p. 68-88.

Film growth in dry oxygen is at first rapid and then slow, the growth rate being inverse logarithmic. The presence of water vapor increases film growth, due to small, though continual, changes in the electrical properties of the films during thickening. (R2, Al)

401-R. Chromium Chemicals in Corrosion Prevention. H. A. H. Pray. Paper from "Chromium", v. I. Chemistry of Chromium and Its Compounds. Monograph Series No. 132. Rheinhold Publishing Corp., p. 343-356.

Effects of chromium compounds in aqueous solution on the corrosion of metals. Ways in which they are used in the production of chemical conversion coatings and other metal-surface treatments. (R5, L14, Cr)

402-R. (German.) **The Scaling of Technical Gold Alloys and Its Avoidance in Heat Treatment.** H. Spengler. *Metall*, v. 10, no. 13-14, July 1956, p. 617-620.

Deals with scaling processes in 12 to 14-carat gold-silver-copper alloys with and without additions of

palladium, nickel and zinc. Silver and palladium decrease the rate of scaling in alloys, while nickel and zinc increase it. (R2, Ag, Au, Cu)

403-R. (German.) **Investigation in the Field of Stress-Corrosion of α-Brass in Ammonia Vapor. II. The Kinetics of Crack Formation.** Franz Aebi. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 421-426.

Graphical representation of durability against initial stress in stress-corrosion tests; mathematical relation. (R1, Cu)

404-R. (Russian.) **Corrosion of the Cylinders of Automobile and Tractor Engines.** B .B. Genbom. *Avtomobil'naia i Traktornaia Promyshlennost',* no. 5, May 1956, p. 18-23.

Temperature of combustion of fuels and other conditions controlling electrochemical corrosion of cylinders. Uneven distribution of temperature on cylinder surfaces as a cause of uneven wear. Effect of variation in engine's cooling system. (R7, R9, Q9, ST)

405-R. (Russian.) **On the Oxidation of Tungsten at High Temperatures.** V. I. Arkharov and Iu. D. Kozmanov. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 361-369.

An experimental study of the phase composition of tungsten scales in the 500 to 1350° C. range and of the mechanism of oxidation at high temperatures. (R2, W)

406-R. The Corrosion Test Spool. R. Law. *Canadian Chemical Processing,* v. 40, July 1956, p. 36-38.

Details and applications of an on-the-job scheme for testing corrosion resistance. (R11)

407-R. The Effects of Contamination by Vanadium and Sodium Compounds on the Air Corrosion of Stainless Steel. G. W. Cunningham and Anton deS. Brasunas. *Corrosion,* v. 12, Aug. 1956, p. 389-405.

The severe corrosion of heat resistant alloys when contaminated by vanadium pentoxide is aggravated by additions of sodium sulfate up to 30%, the most severe mixture being in the region of 15 to 20%. This increased corrosion seems to be related to the oxygen solubility in the molten mixtures. Certain additives are effective in retarding the corrosion. (R3, Na, V, SS)

408-R. The Sulfuric Acid Resistance of Low-Nickel, High-Chromium Steels Containing Molybdenum and Copper. W. Tofaute and H. J. Rocha. *Henry Brutcher, Translation No.* 3731, 12 p. Henry Brutcher, Altadena, Calif. (Abridged from *Technische Mitteilungen Krupp,* v. 12, no. 3, 1954, p. 67-72.)

A simple method of determining passivation ranges; results of corrosion tests. (R6, AY, Cr, Ni)

409-R. Durability of Glued Wood to Metal Joints. Herbert W. Eickner. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1570, Oct. 1954, 33 p.

Comparative durability in various atmospheres and chemicals of joints made with different commercial adhesives. (R3, R5, R6, K12)

410-R. (French.) **Oxidation of Nickel-Chromium Alloys at High Temperatures.** J. Moreau. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 211-216.

Tests to determine if, in a binary alloy, both metals are oxidized simultaneously. Nickel-chromium alloys under atmospheric pressure and between 900 and 1300° C. oxidize simultaneously. (R2, Ni, Cr)

411-R. (French.) **Corrosion in Steam and Condensate Lines. Causes and Prevention.** J. Pierrey. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 225-230.

Corrosion caused by oxygen, and especially carbonic acid plus moisture. Various methods for removing carbonates and bicarbonates from the water. Use of volatile amines and of film-forming amines as neutralizers. (R4, R10)

412-R. (French.) **Tubing of a No. 80 Special Steel Applied in France to Resist Fissuring Corrosion of Gas Rich in H_2S From Lacq Field.** L. Cauchois, J. Didier and E. Herzog. *Revue de l'Institut Francais du Petrole et Annales des Combustibles Liquides,* v. 11, no 5, May 1956, p. 573-583.

Steel is suitable for high-pressure sour-gas field tubing. (R9, T28, ST)

413-R. (German.) **On the Action of Acid Solvents on Certain Hard Silicides and High-Melting Metals.** M. K. Disen and G. F. Huttig. *Planseeberichte für Pulvermetallurgie,* v. 4, no. 1, Apr. 1956, p. 10-14.

Tabulated data on the solubility of $MoSi_2$, WSi_2, VSi_2, $NbSi_2$, $TaSi_2$ and $ZrSi_2$, as well as metallic titanium, zirconium, chromium, molybdenum and tungsten in various acid solvents.
(R6, Ti, Zr, Cr, Mo, W)

414-R. (German.) **The Role of the Dispersed Soil Phase in Underground Iron Corrosion.** T. Markovic, B. Jazbec and N. Plavsic. *Werkstoffe und Korrosion,* v. 7, no. 7, July 1956, p. 385-390.

Effect of dispersed soil particles in the water layer on the corrosion of iron. Oxygen distribution in the liquid column of dispersed alumina particles. (R8, Fe)

415-R. (Serbian.) **Materials for Storage of Sulfuric Acid.** E. Rabald. *Zastita Materijala,* v. 4, no. 6, June 1956, p. 193-197.

The corrosive effect of sulfuric acid on various types of steels and alloys under different conditions. (R6, AY)

416-R. (Book.) **Symposium on Atmospheric Corrosion of Non-Ferrous Metals.** ASTM Special Technical Publication No. 175. 158 p. 1956. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Reports on the 20-year tests sponsored by ASTM. A report on 10 year exposure tests was issued in 1946. (R3, EG-a)

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Inspection and Control

413-S. Aluminum-Base Die-Casting Alloys. I-II. *American Machinist,* v. 100, July 16, 1956, p. 155, 157, 159.

Compositions and characteristics of both standard and special alloys, with a cross-reference chart. (S22)

414-S. Effect of Combustion-Resistant Hydraulic Fluids on Ball-Bearing Fatigue Life. H. V. Cordiano, E. P. Cochran, Jr., and R. J. Wolfe. *ASME, Transactions,* v. 78, July 1956, p. 989-993; disc., p. 994-996.

Phosphate ester, phosphate ester-base and water-glycol-base combustion-resistant fluids and a petroleum oil were investigated to determine relative effects when used as flood lubricants on the life of angular-contact ball bearings.
(S21, Q7)

415-S. The Potentiometric Method for the Determination of Aluminum on a Semimicro Scale. J. R. McCallum. *Canadian Journal of Chemistry,* v. 34, July 1956, p. 915-920.

A technique whereby semimicro quantities of aluminum may be determined in the presence of relatively large amounts of iron with both accuracy and speed.
(S11, Fe, Al)

416-S. Analysis for Small Amounts of Calcium, Magnesium, Barium, and Sulphate Using Phthalein Purple. J. R. McCallum. *Canadian Journal of Chemistry,* v. 34, July 1956, p. 921-925.

The sample is passed through a cation exchange column and washed with distilled water. This solution is boiled and precipitated with excess standard disodium ethylenediaminetetracetate in the presence of alcohol and ammonia using phthalein purple indicator.
(S11, Ca, Mg, Ba)

417-S. Spectrophotometric Estimation of Uranium (VI) by Morellin. B. R. Lakshman Rao and C. C. Patel. *Indian Academy of Sciences, Proceedings,* v. 43, sec. A, May 1956, p. 276-285.

In ethanol medium, morellin and uranium form a reddish brown complex which is destroyed by acid or alkali. (S11, U)

418-S. Parts Inspection Via Camera & Chemicals. Bert Goldrath. *Industrial Photography,* v. 5, July 1956, p. 33,71.

Airline records results of tests for fatigue and other strain by photographing plane parts after oil-dye examination. (S13, Q9)

419-S. Selection and Applications of Spring Materials. *Materials & Methods,* v. 44, July 1956, p. 135, 137.

Data on characteristics, available sizes, application temperature and general properties. (To be continued.) (S22, SG-b, ST)

420-S. Failures of Forged End Bells on Large Electric Generators. *Metal Progress,* v. 70, July 1956, p. 65-72.

Forged austenitic steel rings at ends of rotor shafts on two 100,000-kw. generators in Toronto burst from over-stressing in the region of ventilation holes. (S21, Q25, AY)

421-S. Use of Tap Water in Magnetic Particle Inspection. J. L. McCabe and B. Hirst. *Metal Progress,* v. 70, July 1956, p. 77-79.

Tap water with suitable rust inhibitors and wetting and antifoaming agents may be substituted for the petroleum distillate. (S13)

422-S. Rapid Chemical Analysis With the X-Ray Spectrograph. A. M. Reith and E. D. Weisert. *Metal Progress,* v. 70, July 1956, p. 83-87.

Replaces wet chemistry techniques for routine determinations of difficult-to-handle elements. (S11)

423-S. How Steel Seams Are Detected and Measured. *SAE Journal,* v. 64, July 1956, p. 62-67.

Magnetic or eddy current techniques seem best. Ultrasonic and magnetic particle techniques discussed. (S13)

424-S. (English.) **Inorganic Analysis in Organic Solvents. I. Spectrophotometric Determination of Chromium Following a Chromatographic Separation.** A. J. Blair and D. A. Pantony. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 545-552.

Method in which the 8-hydroxyquinaldate complexes of chromium are separated from those of most other metals by selective adsorption

on activated alumina from organic solvents. (S11, Cr)

425-S. (English.) A Precise Direct Heterometric Determination of Traces of Copper with Diethyldithiocarbamate in Excesses of Metals. M. Bobteisky and R. Rafailoff. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 558-567.

Investigates the most favorable conditions and the influence of complexing agents in the titration process. (S11, Cu)

426-S. (Czech.) Surface Temperature Measurement of Materials by Thermo-Indicators. Kazimir Pospiech. *Slévarenstvi,* v. 4, no. 6, June 1956, p. 191-195.

Development of chemical indicators, based on the change in color as well as the change of state. Properties, uses and evaluation of thermal chalks. (S16)

427-S. (Czech.) Use of Radioactive Isotopes for Nondestructive Testing of Macrostructure of Materials at the K1. Gottwald Ironworks. Oldrich Kozusnik. *Zvaranie,* v. 5, no. 5, May 1956, p. 146-150.

Use of cobalt-60 for testing castings for cracks, discontinuities, foreign particles, cavities, bubbles, cold shuts, poorly fused welds and porosity. Iridium-192, cesium-137, tantalum-182, and mesothorium have been considered. Comparison of X-ray and isotope testing. (S13, M28)

428-S. (French.) Separation of Rb-Cs by Chromatography on Cellulose. Selective Extraction of Fission Cs^{137}. J. Fouarge and G. Duyckaerts. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 527-537.

Separation of microquantities was accomplished successfully only by the use of a phenolic eluant. The method is effective for quantitatives up to "trace" amounts, and Cs^{137} "carrier free" was separated selectively, directly from a nitric solution of irradiated uranium. (S11, U, Rb, Cs)

429-S. (French.) Defining and Controlling the Quality of a Metal. Marcel Prot. *Métaux, Corrosion-Industries,* v. 31, no. 369, May 1956, p. 214-218.

Describes three new French standards: NF X 05-020, (terminology of quality control of industrial products); NF X 06-011 (definition, choice, and specification of the quality of a metal): and NF X 06-012 (technical quality control methods for a metal). (S22, S12)

430-S. (German, French.) Application of Ultrasonics in Light Metals Technology. F. Rohner. *Aluminium Suisse,* v. 6, no. 3, May 1956, p. 82-89.

Principles and diversified uses of ultrasonics in the fabrication of light metals. (S13, EG-a)

431-S. (Hungarian.) Rapid Methods for the Analysis of Aluminum. II. Rapid Photometric Determination of Vanadium With Sulfuric Acid. *Kohaszati Lapok,* v. 9, no. 5, May 1956, p. 238-240.

(S11, Al, V)

432-S. (Spanish.) Use of Flame Photometry in the Analysis of Some Elements Present in Ferrous Alloys. Fernando Burriel Marti, Juan Ramirez and Maria del Carmen Asuncion Omarrementeria. *Instituto del Hierro y del Acero,* v. 9, no. 45, Apr. 1956, p. 417-424.

Study of cobalt, nickel, chromium, manganese and vanadium present in ferrous alloys. (S11, Fe, Co, Ni, Mn, V)

433-S. The Direct Analysis of Uranium-Gallium Alloys. G. W. C. Milner. *Analyst,* v. 81, June 1956, p. 367-369.

Procedure avoids chemical separations; both constituents are determined by volumetric methods. (S11, Ga, U)

434-S. Determination of Small Quantities of Nickel With α-Furildioxime. C. G. Taylor. *Analyst,* v. 81, June 1956, p. 369-371.

Analytical procedure. (S11, Ni)

435-S. The Photometric Determination of Silicon in Steels. T. R. Andrew and C. H. R. Gentry. *Analyst,* v. 81, June 1956, p. 339-348.

An improved method based on the molybdenum-blue reaction, a mixture of ferrous ammonium sulphate and oxalic acid being used for the reduction. (S11, Si, ST)

436-S. The Spectrophotometric Determination of the Alkaline-Earth Metals With Murexide, Eriochrome Black T and With *o*-Cresolphthalein Complexone. F. H. Pollard and J. V. Martin. *Analyst,* v. 81, June 1956, p. 348-353.

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437-S. The Quantitative Analysis of the Alkaline-Earth Metals by Paper Chromatography. F. H. Pollard, J. F. W. McOmie and J. V. Martin. *Analyst,* v. 81, June 1956, p. 353-358 + 2 plates.

Erichrome black T and *o*-cresolphthalein complexone are used in conjunction with a paper-chromatographic separation for the determination of microgram quantities of barium, strontium, calcium and magnesium in synthetic mixtures and in minerals. (S11, EG-f)

438-S. Cutting Tools and Radioisotopes. Use of Radioactive Tracer Elements in Determining Cutting-Tool Life. *Atomics (British),* v. 7, July 1956, p. 229-232, 247.

Isotopes are used to assess tool wear and evaluate cutting coolants in relation to tool life. (S19, Q9, G21, T6)

439-S. Measurement of Thorium in Ores by the Thorium Emanation Method. J. B. Zimmerman and J. A. F. Bouvier. *Canada, Department of Mines and Technical Surveys, Mines Branch Technical Paper* No. 14, 1955, 21 p.

A flow counter for determining the thorium content of ores in secular equilibrium. Scintillations produced in a zinc sulphide phosphor by alpha particles resulting from the disintegration of thoron detected by a photomultiplier tube and registered by a standard scaling unit. (S11, Th)

440-S. The Determination of Thorium by Proportional Counting of Thoron. W. B. Silker. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-32436, Rev., Apr. 1956, 14 p.

A method for the determination of microgram amounts of thorium by proportional counting of thoron, which is continuously purged from a sample in solution by a stream of argon. Optimum flow rate, counter characteristics and the proportional counter used. (S11)

441-S. Suction Pyrometry. T. Land. *Instruments and Automation,* v. 29, July 1956, p. 1314-1320.

Device protects gas from radiant heat transfer to or from surrounding walls. (S16)

442-S. Radio-Active Isotopes for Testing Cutting Tools and Cutting Fluids. *Machinery Lloyd (Overseas Ed.),* v. 28, July 7, 1956, p. 79-80.

Studies were made with irradiated Wimet X8 tungsten carbide consisting of 77% tungsten carbide, 8% cobalt and 15% titanium carbide. (S19, G21, C-n, W)

443-S. Measurement and Control of the Temperature of Moving Parts. II. D. A. Senior. *Machinery Lloyd (Overseas Ed.),* v. 28, July 7, 1956, p. 81-83, 85.

Theory and application of the bolometer, thermopile and the lead sulphide cell. (To be continued.) (S16)

444-S. Mercer's Air-Gauge Approach to Automatic Inspection. D. J. Weatherby. *Metalworking Production,* v. 100, July 6, 1956, p. 1025-1028.

Requirements for dimensional inspection of quantity produced parts; operating principles of pneumatic gaging; advantages. (S14)

445-S. Quality Control Charts Plating Savings. Guy J. Campbell. *Steel,* v. 139, July 23, 1956, p. 90, 92.

Examples of charts for operational control. (S12, L17)

446-S. Functional Gaging Cuts Production and Inspection Costs. W. A. Brillhart. *Tool Engineer,* v. 37, Aug. 1956, p. 88-92.

Study of the function of a part before gaging results in elimination of tolerance buildup, simplified tooling and gaging, greater latitude in machining and helps to cut part costs. (S14)

447-S. Surface Finish Inspection Methods. C. H. Good. *Tool Engineer,* v. 37, Aug. 1956, p. 93-97.

A survey of techniques for the evaluation and measurement of surface quality. (S15)

448-S. The Determination of Uranium in Ores: Separation by Ethyl Acetate Extraction and Spectrophotometric Determination by the Thiocyanate Method in Acetone-Water Medium. H. I. Feinstein. *U. S. Atomic Energy Commission, TEI-555,* Sept. 1955, 16 p.

Reasonable control of acidity and thiocyanate concentration eliminates the erratic results that are sometimes obtained by thiocyanate methods. The use of the extraction procedure permits the determination of uranium in vanadium-bearing ores, minerals and rocks. An accuracy of ± 2% of the accepted value can be readily achieved. (S11, U)

449-S. Precision Spring Manufacture Employing Electronic Controls. H. H. Passolt. *Wire and Wire Products,* v. 31, July 1956, p. 777-778, 814.

Electronic quality control in spring design and uniformity of size. (S12, S14, SG-b)

450-S. (English.) International Conference on Non-Destructive Methods for the Investigation and Testing of Materials. Y. Verwilst. *Acier, Stahl, Steel,* v. 21, no. 6, June 1956, p. 255-258.

Equipment for radiographic, supersonic and magnetic testing reviewed. (S13)

451-S. (English.) On the Accuracy of Strain Determination by Brittle Coatings. Toshio Nishihara, Shuji Taira and Haruoki Maeda. *Kyoto University, Engineering Research Institute Technical Reports,* v. 6, no. 1, Feb. 1956, 12 p.

For the three cases considered, the crack pattern of the coating does not accurately show the strain distribution. Corrections were determined. (S13)

452-S. (French.) Spectrophotometric Analysis of Aluminum in Copper Alloys. Charles Dozinel. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 244-249.

A method of determining directly 0.01 to 10% quantities of aluminum in copper alloys by using thioglycolic acid in its ammonium salt

palladium, nickel and zinc. Silver and palladium decrease the rate of scaling in alloys, while nickel and zinc increase it. (R2, Ag, Au, Cu)

403-R. (German.) **Investigation in the Field of Stress-Corrosion of α-Brass in Ammonia Vapor. II. The Kinetics of Crack Formation.** Franz Aebi. *Zeitschrift für Metallkunde,* v. 47, no. 6, June 1956, p. 421-426.

Graphical representation of durability against initial stress in stress-corrosion tests; mathematical relation. (R1, Cu)

404-R. (Russian.) **Corrosion of the Cylinders of Automobile and Tractor Engines.** B .B. Genbom. *Avtomobil'naia i Traktornaia Promyshlennost',* no. 5, May 1956, p. 18-23.

Temperature of combustion of fuels and other conditions controlling electrochemical corrosion of cylinders. Uneven distribution of temperature on cylinder surfaces as a cause of uneven wear. Effect of variation in engine's cooling system. (R7, R9, Q9, ST)

405-R. (Russian.) **On the Oxidation of Tungsten at High Temperatures.** V. I. Arkharov and Iu. D. Kozmanov. *Fizika Metallov i Metallovedenie,* v. 2, no. 2, 1956, p. 361-369.

An experimental study of the phase composition of tungsten scales in the 500 to 1350° C. range and of the mechanism of oxidation at high temperatures. (R2, W)

406-R. The Corrosion Test Spool. R. Law. *Canadian Chemical Processing,* v. 40, July 1956, p. 36-38.

Details and applications of an on-the-job scheme for testing corrosion resistance. (R11)

407-R. The Effects of Contamination by Vanadium and Sodium Compounds on the Air Corrosion of Stainless Steel. G. W. Cunningham and Anton deS. Brasunas. *Corrosion,* v. 12, Aug. 1956, p. 389-405.

The severe corrosion of heat resistant alloys when contaminated by vanadium pentoxide is aggravated by additions of sodium sulfate up to 30%, the most severe mixture being in the region of 15 to 20%. This increased corrosion seems to be related to the oxygen solubility in the molten mixtures. Certain additives are effective in retarding the corrosion. (R3, Na, V, SS)

408-R. The Sulfuric Acid Resistance of Low-Nickel, High-Chromium Steels Containing Molybdenum and Copper. W. Tofaute and H. J. Rocha. *Henry Brutcher, Translation No.* 3731, 12 p. Henry Brutcher, Altadena, Calif. (Abridged from *Technische Mitteilungen Krupp,* v. 12, no. 3, 1954, p. 67-72.)

A simple method of determining passivation ranges; results of corrosion tests. (R6, AY, Cr, Ni)

409-R. Durability of Glued Wood to Metal Joints. Herbert W. Eickner. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1570, Oct. 1954, 33 p.

Comparative durability in various atmospheres and chemicals of joints made with different commercial adhesives. (R3, R5, R6, K12)

410-R. (French.) **Oxidation of Nickel-Chromium Alloys at High Temperatures.** J. Moreau. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 211-216.

Tests to determine if, in a binary alloy, both metals are oxidized simultaneously. Nickel-chromium alloys under atmospheric pressure and between 900 and 1300° C. oxidize simultaneously. (R2, Ni, Cr)

411-R. (French.) **Corrosion in Steam and Condensate Lines. Causes and Prevention.** J. Pierrey. *Corrosion et Anticorrosion,* v. 4, no. 5, June 1956, p. 225-230.

Corrosion caused by oxygen, and especially carbonic acid plus moisture. Various methods for removing carbonates and bicarbonates from the water. Use of volatile amines and of film-forming amines as neutralizers. (R4, R10)

412-R. (French.) **Tubing of a No. 80 Special Steel Applied in France to Resist Fissuring Corrosion of Gas Rich in H_2S From Lacq Field.** L. Cauchois, J. Didier and E. Herzog. *Revue de l'Institut Français du Pétrole et Annales des Combustibles Liquides,* v. 11, no 5, May 1956, p. 573-583.

Steel is suitable for high-pressure sour-gas field tubing. (R9, T28, ST)

413-R. (German.) **On the Action of Acid Solvents on Certain Hard Silicides and High-Melting Metals.** M. K. Disen and G. F. Huttig. *Planseeberichte für Pulvermetallurgie,* v. 4, no. 1, Apr. 1956, p. 10-14.

Tabulated data on the solubility of $MoSi_2$, WSi_2, VSi_2, $NbSi_2$, $TaSi_2$ and $ZrSi_2$, as well as metallic titanium, zirconium, chromium, molybdenum and tungsten in various acid solvents.
(R6, Ti, Zr, Cr, Mo, W)

414-R. (German.) **The Role of the Dispersed Soil Phase in Underground Iron Corrosion.** T. Markovic, B. Jazbec and N. Plavsic. *Werkstoffe und Korrosion,* v. 7, no. 7, July 1956, p. 385-390.

Effect of dispersed soil particles in the water layer on the corrosion of iron. Oxygen distribution in the liquid column of dispersed alumina particles. (R8, Fe)

415-R. (Serbian.) **Materials for Storage of Sulfuric Acid.** E. Rabald. *Zastita Materijala,* v. 4, no. 6, June 1956, p. 193-197.

The corrosive effect of sulfuric acid on various types of steels and alloys under different conditions. (R6, AY)

416-R. (Book.) **Symposium on Atmospheric Corrosion of Non-Ferrous Metals.** ASTM Special Technical Publication No. 175. 158 p. 1956. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Reports on the 20-year tests sponsored by ASTM. A report on 10 year exposure tests was issued in 1946. (R3, EG-a)

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Inspection and Control

413-S. Aluminum-Base Die-Casting Alloys. I-II. *American Machinist,* v. 100, July 16, 1956, p. 155, 157, 159.

Compositions and characteristics of both standard and special alloys, with a cross-reference chart. (S22)

414-S. Effect of Combustion-Resistant Hydraulic Fluids on Ball-Bearing Fatigue Life. H. V. Cordiano, E. P. Cochran, Jr., and R. J. Wolfe. *ASME, Transactions,* v. 78, July 1956, p. 989-993; disc., p. 994-996.

Phosphate ester, phosphate ester-base and water-glycol-base combustion-resistant fluids and a petroleum oil were investigated to determine relative effects when used as flood lubricants on the life of angular-contact ball bearings. (S21, Q7)

415-S. The Potentiometric Method for the Determination of Aluminum on a Semimicro Scale. J. R. McCallum. *Canadian Journal of Chemistry,* v. 34, July 1956, p. 915-920.

A technique whereby semimicro quantities of aluminum may be determined in the presence of relatively large amounts of iron with both accuracy and speed. (S11, Fe, Al)

416-S. Analysis for Small Amounts of Calcium, Magnesium, Barium, and Sulphate Using Phthalein Purple. J. R. McCallum. *Canadian Journal of Chemistry,* v. 34, July 1956, p. 921-925.

The sample is passed through a cation exchange column and washed with distilled water. This solution is boiled and precipitated with excess standard disodium ethylenediaminetetracetate in the presence of alcohol and ammonia using phthalein purple indicator. (S11, Ca, Mg, Ba)

417-S. Spectrophotometric Estimation of Uranium (VI) by Morellin. B. R. Lakshman Rao and C. C. Patel. *Indian Academy of Sciences, Proceedings,* v. 43, sec. A, May 1956, p. 276-285.

In ethanol medium, morellin and uranium form a reddish brown complex which is destroyed by acid or alkali. (S11, U)

418-S. Parts Inspection Via Camera & Chemicals. Bert Goldrath. *Industrial Photography,* v. 5, July 1956, p. 33,71.

Airline records results of tests for fatigue and other strain by photographing plane parts after oil-dye examination. (S13, Q9)

419-S. Selection and Applications of Spring Materials. *Materials & Methods,* v. 44, July 1956, p. 135, 137.

Data on characteristics, available sizes, application temperature and general properties. (To be continued.) (S22, SG-b, ST)

420-S. Failures of Forged End Bells on Large Electric Generators. *Metal Progress,* v. 70, July 1956, p. 65-72.

Forged austenitic steel rings at ends of rotor shafts on two 100,000-kw. generators in Toronto burst from over-stressing in the region of ventilation holes. (S21, Q25, AY)

421-S. Use of Tap Water in Magnetic Particle Inspection. J. L. McCabe and B. Hirst. *Metal Progress,* v. 70, July 1956, p. 77-79.

Tap water with suitable rust inhibitors and wetting and antifoaming agents may be substituted for the petroleum distillate. (S13)

422-S. Rapid Chemical Analysis With the X-Ray Spectrograph. A. M. Reith and E. D. Weisert. *Metal Progress,* v. 70, July 1956, p. 83-87.

Replaces wet chemistry techniques for routine determinations of difficult-to-handle elements. (S11)

423-S. How Steel Seams Are Detected and Measured. *SAE Journal,* v. 64, July 1956, p. 62-67.

Magnetic or eddy current techniques seem best. Ultrasonic and magnetic particle techniques discussed. (S13)

424-S. (English.) **Inorganic Analysis in Organic Solvents. I. Spectrophotometric Determination of Chromium Following a Chromatographic Separation.** A. J. Blair and D. A. Pantony. *Analytica Chimica Acta,* v. 14, no. 6, June 1956, p. 545-552.

Method in which the 8-hydroxyquinaldate complexes of chromium are separated from those of most other metals by selective adsorption

on activated alumina from organic solvents. (S11, Cr)

425-S. (English.) A Precise Direct Heterometric Determination of Traces of Copper with Diethyldithiocarbamate in Excesses of Metals. M. Bobtelsky and R. Rafailoff. *Analytica Chimica Acta*, v. 14, no. 6, June 1956, p. 558-567.

Investigates the most favorable conditions and the influence of complexing agents in the titration process. (S11, Cu)

426-S. (Czech.) Surface Temperature Measurement of Materials by Thermo-Indicators. Kazimir Pospiech. *Slévarenstvi*, v. 4, no. 6, June 1956, p. 191-195.

Development of chemical indicators, based on the change in color as well as the change of state. Properties, uses and evaluation of thermal chalks. (S16)

427-S. (Czech.) Use of Radioactive Isotopes for Nondestructive Testing of Macrostructure of Materials at the K1. Gottwald Ironworks. Oldrich Kozusnik. *Zvaranie*, v. 5, no. 5, May 1956, p. 146-150.

Use of cobalt-60 for testing castings for cracks, discontinuities, foreign particles, cavities, bubbles, cold shuts, poorly fused welds and porosity. Iridium-192, cesium-137, tantalum-182, and mesothorium have been considered. Comparison of X-ray and isotope testing. (S13, M28)

428-S. (French.) Separation of Rb-Cs by Chromatography on Cellulose. Selective Extraction of Fission Cs^{137}. J. Fouarge and G. Duyckaerts. *Analytica Chimica Acta*, v. 14, no. 6, June 1956, p. 527-537.

Separation of microquantities was accomplished successfully only by the use of a phenolic eluant. The method is effective for quantitatives up to "trace" amounts, and Cs^{137} "carrier free" was separated selectively, directly from a nitric solution of irradiated uranium. (S11, U, Rb, Cs)

429-S. (French.) Defining and Controlling the Quality of a Metal. Marcel Prot. *Métaux, Corrosion-Industries*, v. 31, no. 369, May 1956, p. 214-218.

Describes three new French standards: NF X 05-020, (terminology of quality control of industrial products); NF X 06-011 (definition, choice, and specification of the quality of a metal): and NF X 06-012 (technical quality control methods for a metal). (S22, S12)

430-S. (German, French.) Application of Ultrasonics in Light Metals Technology. F. Rohner. *Aluminium Suisse*, v. 6, no. 3, May 1956, p. 82-89.

Principles and diversified uses of ultrasonics in the fabrication of light metals. (S13, EG-a)

431-S. (Hungarian.) Rapid Methods for the Analysis of Aluminum. II. Rapid Photometric Determination of Vanadium With Sulfuric Acid. *Kohaszati Lapok*, v. 9, no. 5, May 1956, p. 238-240.

(S11, Al, V)

432-S. (Spanish.) Use of Flame Photometry in the Analysis of Some Elements Present in Ferrous Alloys. Fernando Burriel Marti, Juan Ramirez and Maria del Carmen Asuncion Omarrementeria. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 417-424.

Study of cobalt, nickel, chromium, manganese and vanadium present in ferrous alloys. (S11, Fe, Co, Ni, Mn, V)

433-S. The Direct Analysis of Uranium-Gallium Alloys. G. W. C. Milner. *Analyst*, v. 81, June 1956, p. 367-369.

Procedure avoids chemical separations; both constituents are determined by volumetric methods. (S11, Ga, U)

434-S. Determination of Small Quantities of Nickel With α-Furildioxime. C. G. Taylor. *Analyst*, v. 81, June 1956, p. 369-371.

Analytical procedure. (S11, Ni)

435-S. The Photometric Determination of Silicon in Steels. T. R. Andrew and C. H. R. Gentry. *Analyst*, v. 81, June 1956, p. 339-348.

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form to insure the proper pH. (S11, Al, Cu)

453-S. (French.) **A Note About Determining Traces of Aluminum in Steels.** R. Rosotte. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 250-252.

Measurement of light absorption in a suspension of aluminum salt of cupferron at pH 3.9 after eliminating residual iron using a mercury cathode. The method may be used to detect proportions as low as 0.2γ per cu. cm. by nephelometry. (S11, Al, ST)

454-S. (French.) **A Note About the Potentiometric Analysis of Chromium and Vanadium in Steels.** J. Silvestre and M. F. Hurth. *Chimie Analytique,* v. 38, no. 7, July 1956, p. 253-257.

Analytical procedure includes the preliminary oxidation of vanadium and chromium by a perchloric method. Method of dealing with tungsten which may interfere. (S11, Cr, V, ST)

455-S. (French.) **Applications to Iron and Steel Research of the Electronic Probe Microanalyzer.** J. Philibert and C. Crussard. *Revue de Métallurgie,* v. 53, no. 6, June 1956, p. 461-470.

Apparatus allows a rapid elementary analysis of elements with an atomic number greater than 17, with a 1% accuracy. (S11, Fe)

456-S. (German.) **On the Quantitative Analysis of Titanium. I.** P. Wehber, W. Johannsen and M. Heydecke. *Metall,* v. 10, no. 13-14, July 1956, p. 636-639.

Theory of redox reactions, description of a simplified amalgam reductor, simultaneous determination of titanium and iron and analysis of technical products. (S11, Fe, Ti)

457-S. (Russian.) **Determination of Zirconium in Alloys by the Radiometric Titration Method.** I. P. Alimarin and I. M. Gibalo. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 635-636.

Procedures of zirconium determination in pure solutions and in alloys in the presence of other elements, by radiometric titration with phosphoric acid. (S11, Zr)

458-S. (Russian.) **Separation of Tantalum From Titanium by Extraction.** Iu. A. Chernikhov, R. S. Tramm and K. S. Pevzner. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 637-639.

Separation by treating the mixture with hydrofluoric acid and extracting tantalum fluoride with the aid of cyclohexanone; advantages of method. (S11, B14, Ta, Ti)

459-S. (Russian.) **On the Procedures of Photocolorimetric Determination of Cobalt With Nitroso-R Salt.** D. N. Finkel'shtein. *Zavodskaia Laboritoriia,* v. 22, no. 6, June 1956, p. 648-650.

Several improvements on the method suggested. (S11, Co)

460-S. (Russian.) **Spectral Analysis of Titanium and Its Alloys for Nitrogen, Hydrogen and Oxygen.** N. S. Sventitskii, K. A. Sukhenko, P. P. Galonov, O. B. Fal'kova, M. S. Alpatov and K. I. Taganov. *Zavodskaia Laboratoriia,* v. 22, no. 6, June 1956, p. 668-673.

An original spectral method of quantitatively determining nitrogen, oxygen and hydrogen in titanium alloys and hydrogen in titanium powder. (S11, Ti)

461-S. (Russian.) **Extractional Separation of Niobium, Tantalum and Titanium.** *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 269-277.

Extraction in the form of pyrocatechin complex compounds is possible with *n*-butanol, depending on the pH of the oxalate solution. (S11, Cb, Ti, Ta)

462-S. (Russian.) **Isolation of Magnesium, Aluminum, Chromium, Manganese, Iron, Nickel and Copper by Ion-Exchange Methods.** D. I. Riabtshikov and V. F. Osipova. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 278-285.

Reactions with thiosulfate, rhodanides and pyrophosphates are used. (S11)

463-S. (Russian.) **Colorimetric Determination of Copper Traces in Metallic Nickel and Its Compounds in the Ultraviolet Spectrum Field.** K. P. Stoliarov and F. B. Agrest. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 286-291.

Method is based on the adsorption of rays with a wave length of 365-380 mu by an ammoniabromide complex of monovalent copper. (S11, Cu, Ni)

464-S. (Russian.) **A New Semi-Microgravimetric Method of Copper Determination. II. Application of a β-Oxynaphthoic Aldehyde in Analytical Chemistry.** S. I. Gusev and V. I. Kumov. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 303-306.

Determination of copper in alloys and minerals in the form of $C_{22}H_{14}O_4Cu$. (S11, Cu)

465-S. (Russian.) **Kinetic Methods of Quantitative Analysis. III. Determination of Small Amounts of Molybdenum.** K. B. Yatsimirski and L. P. Afanassieva. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 319-322.

Determination is based on utilization of iodide oxidation reaction with hydrogen peroxide. (S11, Mo)

466-S. (Russian.) **A Method for Concentrating Copper Traces by the Use of Organic Reagents.** V. T. Tshuiko and A. U. Mamenko. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 332-336.

Rapid determination methods for copper admixtures in lead, cadmium, nickel and cobalt salts. (S11, Cu)

467-S. (Russian.) **On Lead Detection in Ores by the Grinding Method.** E. P. Oshigov, M. A. Rafienko and L. K. Ivanenko. *Zhurnal Analiticheskoi Khimii,* v. 11, no. 3, May 1956, p. 361-362.

Lead detection by means of potassium iodide using the grinding method with preheating in the last stage shows high specificity and sensitivity. (S11, Pb)

468-S. Brass and Magnesium Die Castings. *American Machinist,* v. 100, July 30, 1956, p. 123.

Compositions and properties. (S22, Cu, Mg)

469-S. Photometric Determination of Germanium With Phenylfluorone. C. L. Luke and Mary E. Campbell. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1273-1276.

Microgram quantities of germanium are determined by isolation with carbon tetrachloride. (S11, Ge)

470-S. Photometric Determination of Tin With Phenylfluorone. Determination of Tin in Lead and 1% Antimony-Lead Alloys. C. L. Luke. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1276-1279.

Microgram quantities of tin are isolated by a carbamate-chloroform extraction. (S11, Pb, Sn)

471-S. Rapid Polarographic Determination of Uranium in Nonaqueous Solvents. D. J. Fisher and P. F. Thomason. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1285-1288.

Well-formed uranium waves are obtained in several nonaqueous media with standard polarographic apparatus. (S11, U)

472-S. Determination of Platinum and Palladium in Ferronickel Assay Buttons. H. G. Coburn, F. E. Beamish and C. L. Lewis. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1297-1300.

Isolation of platinum and palladium from large proportions of iron, nickel and copper was accomplished by cation exchange. (S11, Pt, Pd)

473-S. Ion Exchange-Spectrophotometric Determination of Aluminum. A. D. Horton and P. F. Thomason. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1326-1329.

Aluminum was separated from interferring metal ions by a strongly basic ion exchange resin. Effluent aluminum was determined as the ammonium aurintricarboxylate lake. (S11, Al)

474-S. Determination of Cerium and Chromium in Cerium-Chromium-Uranium Mixtures. Charles V. Banks and Jerome W. O'Laughlin. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1338-1340.

Preferentially oxidized chromium is determined titrimetrically, and cerium is determined, together with chromium, in another sample portion. (S11, Ce, Cr)

475-S. Determination of Traces of Gallium and Indium in Germanium and Germanium Dioxide. C. L. Luke and Mary E. Campbell. *Analytical Chemistry,* v. 28, Aug. 1956, p. 1340-1342.

Photometric determination of 1 to 10 p.p.m. of gallium or indium. (S11, Ga, In, Ge)

476-S. Two New Total Radiation Pyrometers. W. Derganc and S. N. Howell. *Communication and Electronics,* July 1956, p. 360-367.

Design of instruments capable of measuring the temperature of moving material in process. (S16)

477-S. Determination of Low Carbon Contents in Steel. *Iron and Steel Institute, Journal,* v. 183, July 1956, p. 287-299.

Gravimetric, titrimetric, pneumatic and conductimetric methods for the measurement of carbon dioxide evaluated. (S11, CN)

478-S. Finishing Supplement: Quality Control Applied to Plating. Guy J. Campbell. *Metal Industry,* v. 89, July 13, 1956, p. 27-29.

Charts used to control plating solutions. (S12, L17)

479-S. A Magneto-Electric Method for Detecting Defects in Cast Aluminium Rotor Windings for Squirrel-Cage Motors. A. M. Armour and J. W. Walley. *Metallurgia,* v. 54, no. 321, July 1956, p. 43-46.

The method involves turning the rotor slowly at a steady speed in a steady magnetic field and noting any variations in the cross-field due to the induced current: variations indicate defects in the casting. (S13, Al)

480-S. Liquid-Liquid Extraction Procedures in Inorganic Analysis. A Review of Practical Applications With Particular Reference to Metallurgical Analysis. T. S. West. *Metallurgia,* v. 54, no. 321, July 1956, p. 47-51.

Covers extraction of Group VIa, VIIa and the transition metals. (S11)

481-S. (English.) **The Separation of Rhodium and Iridium on a Microscale.** A. D. Westland and F. E. Beamish. *Mikrochimica Acta,* 1956, no.

10, p. 1474-1480.
Rhodium is displaced from a boiling, dilute sulfuric acid solution by antimony dust. Antimony is separated from iridium by distilling the former as the trichloride after which the iridium is determined with *p*-nitrosodimethylaniline. (S11, Ir, Rh)

482-S. Aluminum Base Alloy Die Castings. *Precision Metal Molding*, v. 14, Aug. 1956, p. 49-50.
Composition, properties and characteristics of standard and special alloys. (S22, E13, Al)

483-S. New Way to Check Trace Elements in Zinc. *Precision Metal Molding*, v. 14, Aug. 1956, p. 55, 77.
Technique involves electrolysis at controlled potential. (S11, Zn)

484-S. Selecting Copper and Copper-Base Alloys. II. *Welding Engineer*, v. 41, Aug. 1956, p. 53.
Properties of alloys tabulated. (S22, Cu)

485-S. (French.) **Nondestructive Testing of Metals by Ultrasonics.** M. Palmé. *Corrosion et Anticorrosion*, v. 4, no. 5, June 1956, p. 195-210.
General principles, acoustic impedance, quartz, barium titanate and lithium sulfate transducers, and methods of use. (S13)

486-S. (French.) **Nondestructive Testing of Metals by Gamma-Radiography.** Albert Blondel. *Fonderie*, no. 125, June 1956, p. 213-222.
Various isotopes and considerations regarding their choice. The law of absorption of irradiation by metals and mechanism of absorption. Various factors influencing quality of the image. (S13)

487-S. (German.) **Photometric Determination of Cobalt With the Aid of Alkali Rhodanide and Tri-n-butyl Ammonium Salt.** Max Ziegler, O. Glemser and E. Preisler. *Angewandte Chemie*, v. 68, no. 13, July 1956, p. 436-437.
Cobalt is precipitated as blue tri-n-butyl ammonium-rhodano-cobaltate (II) and extracted with amyl alcohol. (S11, Co)

488-S. (German.) **The Photometric Microdetermination of Cobalt as a Tributylammoniumrhodanide.** Max Ziegler, Oskar Glemser and Eberhard Preisler. *Mikrochimica Acta*, 1956, no. 10, p. 1526-1530.
Rapid process permits accurate determination of cobalt in steel. (S11, Co, ST)

489-S. (German.) **Testing of Metal-Sprayed Sleeve Bearings.** E. Kretzschmar. *Technik*, v. 11, no. 6, June 1956, p. 435-442.
A survey of past methods of testing metal-sprayed sleeve bearings. Some recent experiments with simultaneous spraying of bearings with metals and graphite and on testing of working properties and wear resistance of bearings; equipment used. (S21, Q9, L23)

490-S. (German.) **Ultrasonic Industrial Testing Method for Fine Metal Sheets.** H. Beuse and H. Hartwig. *VDI Zeitschrift*, v. 98, no. 20, July 1956, p. 1057-1061.
Detection of inclusions and their size and location on an industrial scale. (S13)

491-S. (German.) **Carbon in Nonferrous Metals. IV. Carbon Content in Zinc and Zinc Alloys.** J. Fischer and W. Schmidt. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 9, no. 7, July 1956, p. 322-323.
A method of testing zinc for carbon, some experimental results. (S11, Zn)

492-S. (Polish.) **The Application of Radioactive Isotopes in Metallurgy.** Andrezej Staronka. *Hutnik*, v. 23, no. 4, Apr. 1956, p. 154-162.
Uses of radioactive isotopes for testing during the concentration of ores, for measuring gas currents in blast furnaces, for studying carbon in coke, linings of blast furnaces, reduction of metallic oxides by carbon, oxidation of metals, and corrosion and use in analytical chemistry. (S19, D1, B14, R2)

493-S. (Polish.) **Radioactive-Isotopic Inspection.** Tadeusz Florkowski. *Hutnik*, v. 23, no. 4, Apr. 1956, p. 167-172.
Principles of using isotopes, uses of the photographic method and the ionization method, safety considerations. (S19, Co, Ta, Cs, Se, Ir, Tm)

494-S. (Polish.) **Nondestructive Methods of Testing Materials in Industry and Mining.** Ignacy Malocki. *Przeglad Techniczny*, v. 77, June 1956, p. 247-251.
General discussion of X-ray, gamma ray, ultrasonic and magnetic testing of materials. State of the art in Poland. Apparatus and methods. Use in testing insulation for high voltages and for studying formations in mining. (S13)

495-S. (Russian.) **Ultrasonic Control of Welding Joints.** N. V. Khimchenko and V. P. Esilevskii. *Svarochnoe Proizvodstvo*, no. 7, July 1956, p. 18-22.
Detection of flow in welded steel joints by different methods of defect detection. (S18, K general, ST)

496-S. (Book.) **Elements of Quantitative Analysis.** Hobart H. Willard, N. Howell Furman, and Clark E. Bricker. 4th Ed. 576 p. 1956. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J. $5.85.
Text includes theory, applications, and laboratory experiments, using new and improved techniques. (S11)

497-S. (Book.) **Fundamentals of Qualitative Chemical Analysis. Semimicro Method.** Roy K. McAlpine and Byron A. Soule. 4th Ed. 340 p. 1956. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J. $5.00.
A basic text outlining semimicro analytical procedures for a number of common metals and acid radicals, and the principles involved. (S11)

498-S. (Book—German.) **Spectrochemical Industrial Analysis. v. XLIII. Chemical Analysis.** Heinrich Moritz. 2nd Ed. 240 p. 1956. Ferdinand Enke, Stuttgart, Germany.
Textbook includes equipment and analytical procedures for qualitative and quantitative analysis of ores, minerals, and slags. (S11)

T
Applications of Metals in Equipment

189-T. Tantalum Solid Electrolytic Capacitors. D. A. McLean and F. S. Power. *I.R.E., Proceedings*, v. 44, July 1956, p. 872-878.
Advantages include small volume, absence of the necessity for a hermetic seal, flexibility as to shape, superior temperature characteristics, relatively low power factor and indefinitely long shelf life. (T1, Ta)

190-T. New Alloys for Automotive Turbines. D. N. Frey. *SAE Journal*, v. 64, July 1956, p. 33-36.
Three new classes of strong, nonstrategic, low-cost, high-temperature alloys are being developed for use in ground vehicle gas turbines. (T25, SG-h)

191-T. Save With Shaped Wire. *Steel*, v. 139, July 16, 1956, p. 132-315.
Illustrates cold drawn special shapes which conserve raw materials, reduce or eliminate machining and serve as preformed stock with improved machinability and wear resistance. (T7, G17, Q9)

192-T. Electro-Zinc Coated Steel Sheet and Strip. D. A. Winton. *World Refrigeration and Air-Conditioning*, v. 7, June 1956, p. 319-320, 322.
The coated product can be formed with ease and is completely protected from corrosion during storage and at all stages of fabrication. (T27, Zn, ST)

193-T. (French.) **The Frenger Thermo-Acoustic Ceiling.** *Revue de l'Aluminium*, v. 33, no. 232, May 1956, p. 503-506.
Permits low-temperature radiant heating, cooling, soundproofing and ventilation. (To be continued.) (T26, Al)

194-T. (German.) **Light Alloys for Bus Bodies.** E. Zahn. *Aluminium*, v. 32, no. 7, July 1956, p. 417-422.
Weight effects on the earning capacity of buses. Economy of more light alloys in buses. (T21, Al)

195-T. (German.) **Sintered Metals in Electrotechnics.** Rudolf Palme. *Elektrotechnische Zeitschrift*, v. 8, Part B, no. 6, June 1956, p. 233-238.
Application of sintered tungsten, molybdenum and tantalum in electric heating equipment, and X-ray and electronic tubes. (T1, H general, W, Mo, Ta)

196-T. (German, French.) **"Aluman" Roofing.** W. Kulli. *Aluminium Suisse*, v. 6, no. 3, May 1956, p. 97-102.
Description of complicated work involved in application of an aluminum alloy as a roofing material. (T26, Al)

197-T. Choosing Materials for Instrument Manufacture. P. Mabb. *Corrosion Technology*, v. 3, July 1956, p. 217-220, 232.
Some aspects of the care required to prevent contamination of components and quality standards. Use of insulating papers, welding, brazing and soldering. (T8, K1, K7, K8)

198-T. Metal Power Rectifiers With Particular Reference to the Development of Germanium and Silicon. James Stweart. *Electroplating and Metal Finishing*, v. 9, July 1956, p. 212-219, 235.
Production, characteristics and advantages in electroplating installations. (T1, L17, Ge, Si)

199-T. Germanium Power Rectifiers. *Ericsson Review*, 1956, no. 1, p. 24-26.
Produced in three types, the units are of small size in comparison with conventional copper and selenium-type rectifiers. With the new elements it is possible to design rectifier units of smaller dimensions and higher efficiency. (T1, Ge)

200-T. Aluminium Hoppers and Chutes for C.E.A. *Light Metals*, v. 19, July 1956, p. 203-204.
Use of light metals for power station coal chutes prevents blockage. (T25, Al)

201-T. The Utilization of Strip Material in Presswork. *Mechanical World and Engineering Record*, v. 136, July 1956, p. 326-327.
Important factors in design of blanking tools are the grain in the material and economy achieved in using the strip. (T5)

202-T. Margin of Victory—Magnesium. *Modern Metals*, v. 12, July 1956, p. 74-75.

Extra light-weight race car gained faster acceleration and braking. Reduced weight permitted larger fuel tank. (T21, Mg)

203-T. Rock-Bit Design, Selection and Evaluation. I. How Metals Are Chosen for Rock Bits. H. G. Bentson. *Oil and Gas Journal*, v. 54, July 23, 1956, p. 110.

Variation in properties of bit types is accomplished by varying certain factors within the limitations imposed by metallurgy, bit diameter and established criteria. (T28, AY)

204-T. Beryllium-Copper Dies. *Steel*, v. 139, July 30, 1956, p. 116-117, 120.

Beryllium-copper resists corrosion, wears well, is nonsparking and nonmagnetic, has excellent casting qualities, is hard and strong and conducts heat well. Dies are cheap to make, can be remelted and used again. (T5, Be, Cu)

205-T. New High Temperature Alloy for Radiant Tubes in Continuous Annealing Furnaces. *Steel Processing*, v. 42, July 1956, p. 407-408.

Alloy NA22H permits increased furnace capacity and efficiency by increasing rate of heating with higher heat heads, practical engineering design to 2200° F., and longer alloy life per dollar invested. (T5, J23, SG-h)

206-T. Six Advantages of Wire in Product Design. T. W. Whipple. *Wire and Wire Products*, v. 31, July 1956, p. 763-764, 810, 811.

The future of wire product design. (T10)

207-T. (Czech.) **Effect of Macrostructure on the Service Life of Cast-Iron and Hardened Rolls Used for the Cold Rolling of Sheet Metal.** Miloslav Sourek. *Hutnik*, v. 6, no. 4, Apr. 1956, p. 113-117.

Tests to determine nature and depth of hardened layer, criteria of good rolls, effect of composition of steel rolls, certain elements and impurities, stresses developed during solidification and thickness of hardened layer. (T5, F23, M28, S21, ST, CI)

208-T. (German.) **Aluminum in Shipbuilding.** R. Pertusini. *Aluminium Ranshofen, Mitteilungen*, v. 4, no. 1, Apr. 1956, p. 10-14.

Possible uses of light metals and alloys in shipbuilding for inland navigation. Uses in ship hulls, superstructures and fixtures. (T22, Al)

209-T. (German.) **Importance of Aluminum in Reactor Building. II.** Fritz Regler. *Aluminium Ranshofen, Mitteilungen*, v. 4, no. 1, Apr. 1956, p. 18-22.

Various uses of aluminum in reactors. Advantageous nuclear properties include excellent malleability and good heat conductivity, as well as good corrosion resistance and mechanical strength at low temperatures. Owing to its low melting point, however, the use of aluminum in reactors is limited to lower temperatures. (T25, Al)

210-T. New Uses for Magnesium Die Castings. *Automotive Industries*, v. 115, July 15, 1956, p. 62-63.

Tabulated data show weight and cost advantages. (T21, Mg)

211-T. Nickel in World Coinage. A. S. Tuttle. *Canadian Metals*, v. 19, July 1956, p. 30-32, 34.

Choice of an alloy for coinage; ancient and modern minting procedures. (T10, Ni)

212-T. Resists Carburization at 1750° F. *Chemical Processing*, v. 19, Aug. 1956, p. 14-17.

Incoloy is shown to be equal or superior to other alloys used for furnaces in the field of ethylene manufacture. (T29, Ni)

213-T. Welded Structures in Cranes and Mill Equipment. I. W. Evans. *Iron and Steel Engineer*, v. 33, July 1956, p. 105-108; disc., p. 108-110.

Reasons for increase in welding applications; some views on the subject of riveted girders versus welded girders. (T5, K1)

214-T. Sintered Steel—for High Shear Strength Service. John D. Howell. *Precision Metal Molding*, v. 14, Aug. 1956, p. 51, 56.

Oil-impregnated Super-Oilite spline inserts for drill press shafts give satisfactory performance. (T7, ST)

215-T. They Use 70 Castings in 4 Alloys in This Modern Duplicator. *Precision Metal Molding*, v. 14, Aug. 1956, p. 42-44.

Machine designed to take full advantage of an effective range of properties and characteristics available from die and permanent mold castings. (T9, E12)

216-T. Facts About Stainless Steel Drainage. W. E. McFee. *Heating and Air Conditioning Contractor*, v. 47, July 1956, p. 48-51.

Components used in a roof drainage system, with the accent on stainless steel applications. (T26, SS)

V

Materials

General Coverage of Specific Materials

141-V. Titanium Today. *American Machinist*, v. 100, July 16, 1956, p. 129-144.

Data on costs, consumption, supply and recent developments; bibliography of recent articles; a color-illustrated case study on fabricating titanium sheet; experience with arc welding titanium alloys in open air. (Ti)

142-V. Mechanical Steel Tubing for Parts Fabrication. *Materials & Methods*, v. 44, July 1956, p. 100-102.

Cut-off tube sections can be machined, forged or cold formed to produce many parts at lower cost than possible with solid bar stock. (G general, ST)

143-V. (Polish.) **Beryllium Copper.** Kazimierz Kurski. *Wiadomosci Hutnicze*, v. 12, no. 6, 1956, p. 173-177.

General discussion of copper-beryllium alloys; properties and uses of alloys containing 1.7% and 2.0% beryllium; effects of different periods of age hardening and of nickel and cobalt additions; hot and cold forming. (Be, Cu)

144-V. (Polish.) **Titanium—Metal of the Future.** Ludwik Gielicz. *Wiadomosci Hutnicze*, v. 12, no. 6, 1956, p. 181-184.

Comparison of properties of aluminum, iron and titanium. Titanium is widely used for welding electrode coating, but metal was not produced on commercial scale until 1948. Discussion of titanium ores. Possibility of obtaining titanium from blast furnace by-products. (Ti)

145-V. (Spanish.) **Theory and Practice of High-Speed Steels Containing Aluminum. Recent Investigations With High-Carbon Steels Containing Nitrogen.** Roland Mitsche. *Instituto del Hierro y del Acero*, v. 9, no. 45, Apr. 1956, p. 375-385.

Effect of aluminum additions on fabrication, structure and properties. (TS, Al)

146-V. Lithium. L. Sanderson. *Canadian Mining Journal*, v. 77, July 1956, p. 70-71, 76.

Extraction methods, properties, uses and alloys, sources. (Li)

147-V. Fabrication of Titanium. *Metal Industry*, v. 89, July 6, 1956, p. 11-12.

Stretch forming, use of drop hammers, welding, mechanical properties influencing springback. (G9, G3, K general, Q general, Ti)

148-V. Constant Modulus Alloy for Elastic Elements. Marshall Ward. *Product Engineering*, v. 27, July 1956, p. 135-140.

"Ni-Span C", a hardenable, high strength and heat-resistant nickel-chromium alloy, maintains constant elastic modulus over −50 to 150° F. Physical and mechanical properties and design stresses; heat treating time and temperature; machining, cleaning and joining procedures. (P general, Q general, J general, G17, Ni, Cr)

149-V. How to Use the New Low Nickel, Austenitic Stainless Steels. *Steel Processing*, v. 42, July 1956, p. 404-406.

Properties, corrosion resistance, fabrication, welding characteristics and chemical compositions. (SS)

150-V. Tool and Die Steels for Hot Working Operations. E. Johnson. *Alloy Metals Review*, v. 8, June 1956, p. 2-9.

The main characteristics, properties and uses of some typical hot work steels. (TS)

151-V. Department of Defense Titanium Sheet-Rolling Program. W. J. Harris, Jr. *Battelle Memorial Institute, Titanium Metallurgical Laboratory Report No. 46*, June 1956, 22 p.

Outline of the participants in and objectives of the sheet-rolling program includes target properties for alloys, properties of candidate alloys and some suggested testing procedures. (F23, Ti)

152-V. Stainless Steel Castings. F. R. H. Allon. *Canadian Metals*, v. 19, July 1956, p. 38.

Varieties of stainless steel and their characteristics. (SS)

153-V. Zirconium: Problems and Trends. W. E. Kuhn. *Canadian Metals*, v. 19, July 1956, p. 40, 42.

Corrosion resistance, applications in atomic reactors and in the chemical industry. (Zr)

154-V. The Platinum Metals. *South African Mining and Engineering Journal*, v. 67, pt. 1, June 1956, p. 1035 + 5 pages.

World resources, current metallurgical practices and the uses of this important group of metals. (A4, Pt)

155-V. (French.) **Producing a Complex Copper Alloy: U-E3-S.** *Fonderie*, no. 125, June 1956, p. 238-241.

Alloy used in aircraft construction has a hardness of 85 to 100 Brinell units. Production is a very delicate operation. (Cu)

156-V. (German.) **Literature Review.** *Aluminium - Industrie - Aktien - Gesellschaft, Forschungsinstitut*, no. 13, July 1956, p. 156-170.

Review of literature on aluminum and its alloys, applications in industry and construction and properties. (T general, Al)

157-V. (Book.) Chromium. v. I. Chemistry of Chromium and Its Compounds. Marvin J. Udy. Monograph Series No. 132. 433 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York, N. Y. $11.00.

History of chromium; mineralogy and geology; chemical and physical properties; analytical chemistry; manufacture and use of chromium and its compounds. (Cr)

158-V. (Book.) Sodium, Its Manufacture, Properties and Uses. Marshall Sittig. Monograph Series No. 133. 529 p. 1956. Reinhold Publishing Corp., 430 Park Ave., New York, N. Y. $12.50.

Includes analysis and thermodynamics of sodium. (S11, P12, Na)

EMPLOYMENT SERVICE BUREAU

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METALLURGIST: Opportunity for experienced graduate metallurgist to grow with manufacturer of precision equipment utilizing plain carbon and alloy steels, alloy cast iron and nonferrous alloys. Emphasis will be placed on analysis of service failures, material specifications and heat treatment problems in coordination with product development, manufacturing and quality control. Box 9-15.

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METALLURGIST — PROCESS CONTROL: Responsible position for graduate metallurgist with manufacturer of forgings, fittings and pipe. Will exercise metallurgical control over all processing of product. Experience in the hot forming and heat treating of ferrous materials essential, with some knowledge of stainless and superalloy grades desirable. Experience in welding helpful. Prefer individual 25 to 30 who is looking for challenge and opportunity. Box 9-85.

METALLURGISTS — LABORATORY INVESTIGATIONS: Several openings exist in metallurgical department of large producer of forgings for graduate metallurgists with several years experience. Will perform investigations on service failures, processing difficulties, raw materials. Competent knowledge of metallography of ferrous materials, preferably including austenitic alloys, is essential, with ability to write clear, concise reports. Box 9-90.

SALESMEN: Solventol Chemical Products, Inc., manufacturers of industrial washers and cleaning chemicals, has several openings for men who are hard-hitting salesmen and self-starters and who want to grow and prosper in an expanding company. Must be experienced in metal cleaning. Salary, commission and expenses. Write: Solventol Chemical Products, Inc., 15841 Second Blvd., Detroit 3, Mich.

RESEARCH SUPERVISOR: Metallurgist to perform and supervise research in field of high-temperature materials. Experience should be such that the man chosen could direct the efforts of small research group. Areas of research include: study and development of high-temperature alloys, studies of creep and relaxation, behavior of materials in corrosive environments, determination of properties, and specification of materials for high-temperature use. Our company is moderate size, nonprofit research organization. Salary for this position will depend upon the man chosen, and probably will exceed $10,000. All replies will be treated as confidential. Box 9-95.

METALLURGICAL ENGINEERS: Openings exist for metallurgical laboratory, mill production, and research and development assignments. Can place young metallurgical engineers, from no to five years experience. Plants in Bridgeville within 15 miles of downtown Pittsburgh, and Titusville, in heart of hunting and fishing country, 100 miles north of Pittsburgh. Company a leading producer of tool-steel, stainless steel and superalloys. Send complete resume indicating location preference to: R. D. Crissman, Personnel Dept., Universal-Cyclops Steel Corp., Bridgeville, Pa.

MILL METHODS MAN: As technical representative of works manager in mill operating department. Responsibility includes establishment of material specification, operation sequence, processing standards and quality checks so end product meets dimension, surface, straightness, temper and other physical properties. Box 9-100.

The Air Technical Intelligence Center has reported immediate position openings for metallurgists high strength to weight ratio metals). Applicants must be well versed in physical, mechanical and process metallurgy. Positions consist primarily of research planning. No actual laboratory work involved. Salaries to $7570 per year. Write: Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio, c/o T. J. Connair, Jr., Major, U.S.A.F., Adjutant.

West

METALLURGIST: Graduate with five years experience in drop and press forging of specialty steels and nonferrous metals and alloys for forge plant in Los Angeles area. Capable of establishing quality control procedures and to direct small laboratory. Send complete details of education and experience and photograph. State salary requirements. Box 9-25.

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PHYSICAL METALLURGISTS, minimum of 5 years experience with heat-resistant materials.

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PHYSICAL METALLURGISTS with experience, to coordinate with design groups in the development of aircraft castings with optimum properties.

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Send resume of training and experience to:

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METALLURGISTS

Several openings exist in the Metallurgical Departments of our plants in Cleveland, Pittsburgh and Aliquippa, Pa., for metallurgists with B.S. degree and up to five years experience, preferably in the steel industry.

Opportunity for varied experience, leading to increasing responsibility and earning capacity in metallurgical investigation, customer contact, or operations supervision.

Of particular interest would be experience in production of electric-weld line pipe (Aliquippa) and arc furnace melting (Cleveland).

Openings also for research metallurgists (Ph.D., M.S., or B.S.) at our Pittsburgh laboratories.

Write in confidence to

J. A. Hill
Research and Development Department

JONES & LAUGHLIN STEEL CORPORATION

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Pittsburgh 30, Pennsylvania

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EXCEPTIONAL OPPORTUNITIES AVAILABLE FOR ENGINEERS TRAINED AND INTERESTED IN PROCESS METALLURGY, INCLUDING ALL STAGES OF SMELTING, MELTING, AND REFINING OF HIGH QUALITY CARBON, ALLOY AND STAINLESS STEELS. CHEMICAL ENGINEERING OR METALLURGICAL DEGREE REQUIRED, WITH A COMBINATION OF BOTH VERY DESIRABLE, PLUS FOUR OR MORE YEARS OF RESEARCH EXPERIENCE.

EXCELLENT SALARY AND BENEFITS ARE AVAILABLE WITH OPPORTUNITIES FOR CREATIVE DEVELOPMENT AND PROFESSIONAL ADVANCEMENT IN THIS EXPANDING PITTSBURGH RESEARCH LABORATORY OF A LEADING MANUFACTURER OF SPECIALTY STEELS AND ALLOYS.

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B. S. degree in metallurgy with a minimum of 2 years' experience in any of the following fields:

- Powder metallurgy.
- Heat treating.
- Production metallurgy, such as joining, welding, brazing, soldering.
- Semiconductor device production.

WRITE, outlining qualifications and experience, to:

C. R. Chase, Personnel Department
Research and Development Laboratories
INTERNATIONAL BUSINESS MACHINES CORP.
Poughkeepsie, N. Y.

METALLURGISTS: Physical or fabricating metallurgists, metallurgist-ceramist, physical chemists (inorganic) and chemical or mechanical engineers with interest in metallurgy for attractive openings in modern plant operated under A.E.C. contract. Send complete resume to: W. M. Bean, Manager, Industrial Relations, The Dow Chemical Co., Rocky Flats Plant, P. O. Box 2131, Denver 1, Colo.

POSITIONS WANTED

METALLURGICAL ENGINEER: B.S. degree, age 29, family. Five years in aluminum and copper fabrication of sheet, strip, tubing and extrusions, two years in Army ordnance titanium research. Desires position in nonferrous production at/or leading to supervisory level. Available April 1957. Box 9-30.

METALLURGIST: Age 25, B.S. degree from University of California, 1954. Total of three years experience including openhearth and foundry, precision casting of steel, material selection, metallography and specification writing. Desires position requiring initiative, and leading to responsibility in production or development in a small company. Presently in Army; available January 1957. Box 9-35.

RESEARCH METALLURGIST: Ph.D. degree, age 33, family. Excellent record heading metallurgical laboratory for smaller company. Results include successful development of new alloys and the necessary techniques for their commercial fabrication. Thorough background in cast metal problems. Seeking increased responsibilities. Prefers West Coast, especially San Francisco Bay area. Box 9-40.

METALLURGIST: Age 30, B.S. degree, family. Excellent foundation and experience in control, operation and maintenance of controlled atmosphere furnace equipment. Familiar with and experienced in specification and heat treating of carburizing and constructional alloy and carbon steels in gear applications. Wants responsible position with opportunities for advancement. Box 9-45.

METALLURGIST-EDITOR-WRITER: New York City, broad experience in properties and applications of ferrous and nonferrous metals, including those just coming into commercial production. Registered professional engineer. Not interested in laboratory reasearch. Box 9-50.

METALLURGICAL ENGINEER: M.S. degree, age 25, married with family, veteran. Three years diversified experience in copper-base and light metals development and production with additional experience in high-temperature alloy applications in atomic power units. Desires responsible position in development or production. West preferred. Available immediately. Box 9-55.

FERROUS METALLURGY OR SALES: Degree, age 39, fully qualified to represent producing mill at responsible level. Now on West Coast. Resume on request. Box 9-60.

METALLURGIST: Age 29, B.S. degree, married. Five years experience in ferrous and nonferrous production and development; ferrous heat treatment and engineering sales. At present chief metallurgist for industrial furnace manufacturer. Wants position with management responsibilities, preferably located in Midwest, although not essential. Box 9-65.

STAFF CHEMICAL ENGINEER: With 20 years experience in automotive, aircraft and diesel engine fields. Laboratory and plant process control backgrounds, paints, cleaners, cements, sealers, lubricants, and good working knowledge of metallurgy included. Fully qualified for responsible position in a chemical, metallurgical or quality control laboratory. Detroit area. Box 9-70.

CHIEF METALLURGIST: B.Sc.Eng. (Metallurgy) London University. Age 29, ten years diversified experience in high-frequency melting, hot and cold rolling and heat treatment of grain oriented silicon-iron, nickel-iron and chromium-iron alloys. At present in charge of modern shell molding steel foundry and quality control laboratory in United Kingdom. Desires position in foundry, steel processing, continuous casting of steel, technical salesman for steel mill equipment. Available July 1957. Box 9-105.

METALLURGIST: International reputation, 20 years experience with light metals, nonferrous, stainless steels, superalloys, titanium. Includes forming, welding, heat treating, all methods of casting. Good speaker and writer. Would like to be retained as consultant by one or more companies desiring high level metallurgical assistance. Box 9-110.

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With one of the most substantial and oldest producers of ferro-alloys for the iron and steel industry.

GENERAL TECHNICAL ASSISTANT—Sound metallurgical education and wide knowledge of metallurgical processes and industries is essential. Experience in some phase of the steel industry is desirable, and research experience would be particularly valuable. Should have a thorough knowledge of library science as the result of specialized education or research experience. Work requires an ability to write fluently and accurately.

TECHNICAL FILE ADMINISTRATOR—Sound metallurgical education is essential. Should have a knowledge of library science through specialized education or research experience. Should have knowledge of a wide range of metallurgical processes and familiarity with the metals industry. Must have the ability to write accurately and fluently.

METALLURGIST OR METALLURGICAL ENGINEER—For field development work on use of alloys in electric steel melting and high-temperature alloys. B.S. degree, several years' experience and moderate travel is required.

SALARY: Commensurate with qualifications and past experience. Please send resume, present salary and salary requirements to:

Box 9-75, Metals Review

METALLURGISTS

Ph.D. or M.S. scientists for basic research in high temperature materials; magnetic materials; plasticity; mechanism of fracture; effect of alloys and impurities.

For further details, write to:

R. G. Matters
Research Laboratories
Allis-Chalmers Mfg. Co.
Milwaukee 1, Wisconsin

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Box 9-125, Metals Review

METALLURGICAL ENGINEER

Some experience helpful but not necessary for research and development work in atomic energy field. Work includes development of nuclear fuel alloys, fabrication of fuel elements and the bonding of fuel elements to various corrosion resistant cladding materials. Excellent benefits. Salaries open. Modern facilities. Write to: Personnel Manager, Babcock & Wilcox Research Center, Alliance, Ohio.

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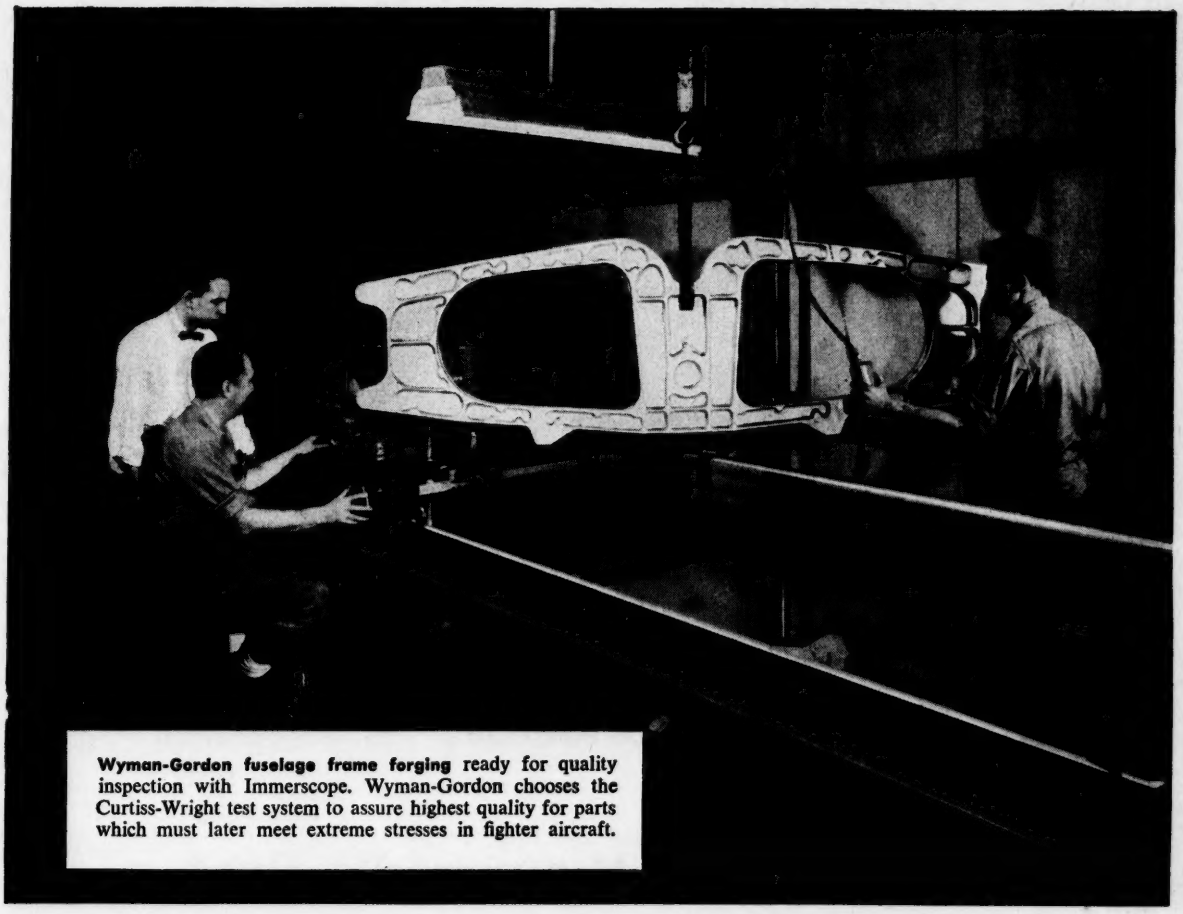
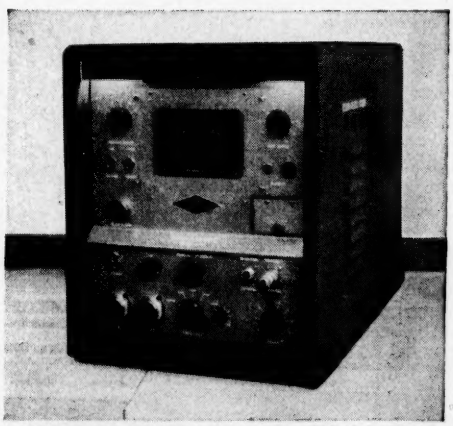
Electrical Engineer	B.E.E.: Relay Circuitry Experience
Service Engineers	B.Me.E., B.E.E., or B.Met.E. Degree

Write: **IPSEN INDUSTRIES, INC.**, 715 South Main St., Rockford, Ill. Include resume and salary requirements. Confidential.



Wyman-Gordon fuselage frame forging ready for quality inspection with Immerscope. Wyman-Gordon chooses the Curtiss-Wright test system to assure highest quality for parts which must later meet extreme stresses in fighter aircraft.

CURTISS-WRIGHT IMMERSCOPE PROVES SOUNDNESS OF FORGINGS BEFORE SHIPMENT FOR WYMAN-GORDON



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